DOCUMENT RESUME

ED 354 820 HE 026 240

AUTHOR	Jones, Robert F.
TITLE	American Medical Education: Institutions, Programs, and Issues.
INSTITUTION	Association of American Medical Colleges, Washington, D. C.
PUB DATE	Nov 92
NOTE	45p.
AVAILABLE FROM	Association of American Medical Colleges, 2450 N St., N.W., Washington, DC 20037.
PUB TYPE	Information Analyses (070) -- Reports - Descriptive (141)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Behavioral Science Research; Biomedicine; College Faculty; Curriculum Development; Educational Change; *Educational Finance; Educational Objectives; Education Work Relationship; Expenditures; Financial Support; Graduate Medical Education; *Health Services; Higher Education; Information Management; Internal Medicine; *Medical Education; *Medical Research; *Medical Schools; Medical Students; Occupational Surveys; Outcomes of Education; Physicians; Postdoctoral Education; Researchers; Teaching Methods
IDENTIFIERS	*Association of American Medical Colleges; Research and Graduate Training Facilities; Research Training

ABSTRACT

This report presents information about the academic medical centers belonging to the Association of American Medical Colleges (AAMC) and profiles American medical education generally. Following a brief introduction, a section on institutions and resources offers information on medical schools' financial support, faculties, and faculty practice organizations. This section also provides similar information on teaching hospitals. The next section discusses education and covers: (1) admissions (applicant trends and enrollment and physician supply); (2) tuition and financial assistance; (3) educational program and curriculum reform (content, approaches to learning, advances in medical informatics, and sites for clinical education); (4) graduate medical education (the generalist imperative, financing graduate medical education, and resident hours and supervision); and (5) evaluation and standards (accreditation and licensure and assessing clinical competence). A section on biomedical and behavioral research discusses research support through project grants, indirect grants, training of new investigators and resources and facilities as well as social and professional issues in the use of animals in research and standards of conduct. A section on health care and health care services research looks at teaching hospitals and health care delivery and population health and health services research. A final section describes the history and mission of the AAMC. (JB)

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Institutions, Programs, and Issues

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AMERICAN MEDICAL EDUCATION
Institutions, Programs, and Issues

November 1992

An AAMC Staff Report Prepared by
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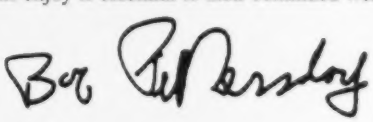
FOREWORD

The Association of American Medical Colleges is pleased to present "American Medical Education: Institutions, Programs, and Issues." This is an updated and revised version of a publication that originally appeared in 1977. Like the five previous editions, this document presents concise and cogent information about the academic medical centers that are the Association's members.

There are two elements to the publication. First, the document provides an easy reference on the characteristics of American medical education. It includes data and statistics on medical schools and teaching hospitals, their students and residents, faculties and other resources. There is also information on the education, research, and patient care missions of these institutions. For the most part, these data are drawn from the broad array of informational resources that AAMC maintains on academic medicine.

This document does not intend merely to provide descriptive information on American medical education. By exploring a number of critical issues relating to the academic medical enterprise, it attempts to provide a more substantive overview of academic medical institutions and the challenges they face in carrying out their activities and meeting their societal responsibilities.

The Association hopes that this publication will help to improve public understanding about academic medical centers and American medical education. The strong public support that our member institutions enjoy is essential to their continued well-being.



Robert G. Petersdorf, M.D.
President
Association of American Medical Colleges

INTRODUCTION

American medical education is the product of important initiatives first taken during the mid- and late-nineteenth century by the University of Pennsylvania, the College of Physicians and Surgeons in New York, Lind (later Northwestern) University, Harvard University, and the University of Michigan. The vision and leadership of those associated with the founding of the Johns Hopkins Medical School in 1893 led to the creation of a university-based, graded four-year educational program, combining laboratory instruction with supervised hospital experience. The Hopkins model eclipsed the many proprietary programs of marginal quality that existed at the time. In 1910, Abraham Flexner, supported by the Carnegie Foundation, published a thorough review and critique of medical schools in the United States and Canada, leading to further reforms and institutionalization of the present-day model of the scientifically trained physician.

Despite fidelity to this heritage, the complex of institutions and programs devoted to medical education near the end of the twentieth century bears little resemblance to that present at its beginning. Prior to World War II, medical schools were fewer in number and concerned primarily with education for the M.D. degree. Postwar investment in biomedical and behavioral research transformed many medical schools into large-scale research institutions. Medical capability increased and medical insurance expanded, leading to a demand for health care services. In the 1960s the nation mobilized for a substantial expansion of its capacity for training health professionals.

In the ensuing years, medical schools and teaching hospitals have evolved into large, complex academic medical centers, under university auspices or as affiliated institutions with varied interinstitutional agreements and arrangements. These institutions share common missions: to provide general professional education and specialized graduate training of future physicians, to lead in biological and behavioral investigation, and to champion the application of new knowledge in the alleviation of suffering, rehabilitation of injury, and prevention of disease and premature death. These same institutions currently play a significant role in society's medical obligations to its poorest members.

As the nation prepares for the next century, it faces new challenges in advancing the health of its citizenry: the escalation of health care costs, the implications of new and developing technologies, the persistent problems of access to services, and the variable quality of care. In the face of these problems, academic medical centers are being asked to reexamine and expand their missions, restructure their services, and review and revitalize their programs. Their success is one in which all need to be concerned. Academic medical centers are a national resource, fragile in nature, and essential to accomplishing important national objectives. This monograph presents a brief description of these institutions — their structure, financing, interrelationships, and programs — and the issues which they and society face in preserving and enhancing their unique contributions to the national well-being.

INSTITUTIONS AND RESOURCES

The mission of academic medical centers has remained constant throughout the century: to teach, conduct research, and provide patient care. The institutions and resources dedicated to this mission have undergone enormous growth and change, however, particularly over the last three decades.

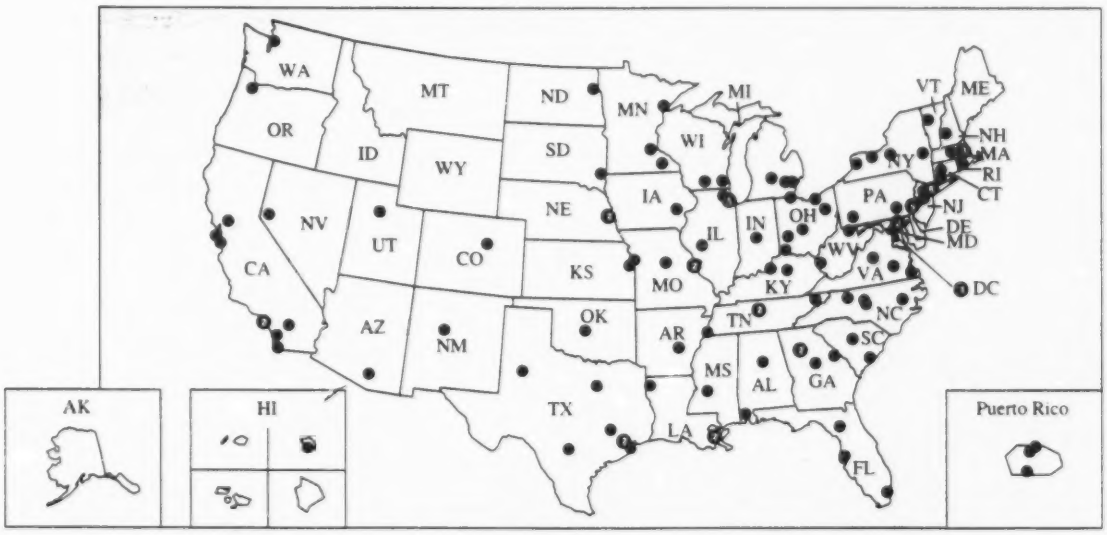
Medical Schools

At the turn of the century as many as 160 medical schools operated in the United States, many of marginal or poor quality. The reforms recommended by the Flexner report and subsequent elevation of standards led to the demise of many of these institutions and slowed the pace with which new ones were inaugurated. By 1960, the number of U.S. medical schools accredited by the Liaison Committee on Medical Education (LCME) stood at 86. The perception of an impending physician shortage at that time stimulated the development of 40 new medical schools by 1980. Since 1980, only one additional medical school has been established, while another closed, maintaining the number of accredited schools at 126.

Forty-four states, the District of Columbia, and Puerto Rico each have at least one medical school (**Figure 1**). The six states without medical schools have negotiated arrangements for their citizens to receive medical training at schools in neighboring states. At present, 52 medical schools (41 percent) are private schools; however, 36 of these schools received financial appropriations in 1990-91 from their state governments.

Although the 126 medical schools share many purposes and objectives, they are also quite diverse. Most are part of a comprehensive public or private university, but 21 medical schools are independent and freestanding or a part of a health science university. Traditionally, medical schools have developed by building or affiliating with large major teaching hospitals and by recruiting a full-time academic fac-

Figure 1 • **126 Medical Schools Are Accredited in the U.S.**



ulty. Many of the medical schools founded in the 1970s, however, were planned with community hospitals as the venue for teaching and community physicians as the teaching faculty. The creation of these "community-based" schools was specifically motivated by the desire to supply primary care physicians for underserved areas in their respective states.

Even more specific and unique purposes have guided the development of other medical schools. Three schools, Howard, Morehouse, and Meharry, are associated with historically black colleges and have a special mission to educate minority physicians. One federally owned school, the Uniformed Services University of the Health Sciences, trains physicians for the uniformed services. Five medical schools, at Wright State University, the University of South Carolina, East Tennessee State University, Texas A&M University, and Marshall University, trace their development to a special partnership between the Department of Veterans Affairs (VA) and state governments. These medical schools have VA medical centers as the chief clinical training site. The diversity of medical schools — in history and tradition, mission, organizational structure, financial resources, and facilities — is a major strength of the American medical education system. It provides the nation with a rich array of institutional resources to meet local, regional, and national needs.

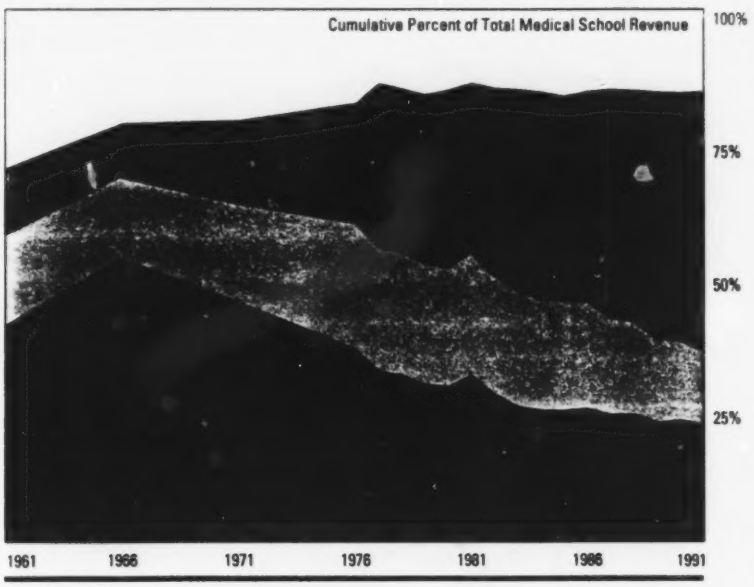
Financial Support

Revenues supporting the operations (excluding construction and student loans) of medical schools in 1990-91 amounted to $21 billion. The 126 schools exhibited vast differences in revenues and financing, from $5.6 million to $639 million, with a median of $143 million. Trends in the growth of financial resources of medical schools since 1960 are best understood in terms of two distinct periods. The 1960s and 1970s witnessed nearly a 50 percent increase in the number of medical schools accompanied by a fivefold increase in full-time faculty, a doubling of the number of medical students, and a tripling of the number of residents and fellows. Revenues supporting medical school operations grew from $436 million to $6.5 billion during these decades, for an annual growth rate of 14.5 percent (8.7 percent adjusted for inflation). Since 1980, the number of medical schools has remained the same and student enrollment has been fairly level, but revenues have continued to increase, at an annual rate of 12.5 percent (7.5 percent adjusted for inflation). The continued expansion of medical school faculties and increases in funds from research and medical service are largely responsible for the growth in revenues during the 1980s.

The diversity of medical schools — in history and tradition, mission, organizational structure, financial resources, and facilities — is a major strength of the American medical education system.

Of the total revenues to medical schools in 1990-91, 22 percent came from the federal government in the form of grants and contracts for teaching, research, and service programs, including recovery of indirect costs associated with these programs. Federal research funds continue to represent the major component of direct federal support to medical schools, accounting for $4 billion (19 percent) of total revenues. As a fraction of medical school revenues, federal funding peaked at about 55 percent in the mid-1960s and has declined gradually but consistently to its present level of 22 percent (**Figure 2**). However, additional federal support for medical education has continued through other means, for example, reimbursements to hospitals for the direct costs of graduate medical education and Medicare reimbursements for the patient care provided by faculty physicians. Appropriations and non-service contract revenues

Figure 2 • **Medical Service Is Now the Largest Source of Medical School Revenue**

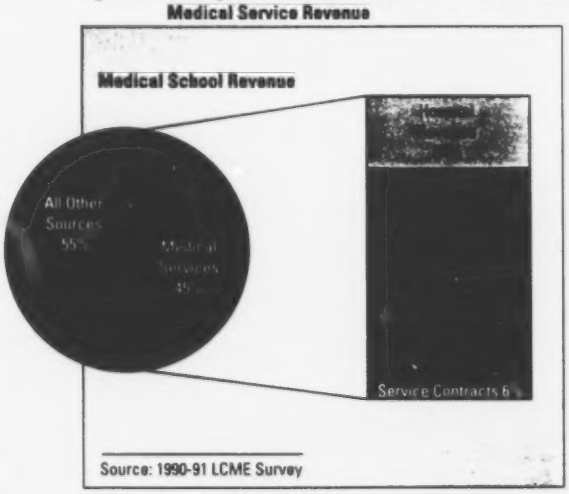


from state and local governments increased significantly during the 1960s and early 1970s, but since then increases have slowed and the proportional contribution of this source of medical school funding has declined, reaching a 14 percent level in 1990-91.

Revenues from patient care activities have expanded significantly over the past few decades and currently constitute the largest single source of funding for medical schools. This category includes fees generated by clinical faculty for professional services and collected through faculty practice plans, reimbursements from affiliated hospitals for clinical faculty services, and medical service contracts (**Figure 3**). In 1990-91 reported income from the professional services of clinical faculty accounted for 45 percent of total medical school revenues, an amount that may be understated because of differences in income reporting arrangements. Thirty years earlier, it constituted only 6 percent.

The sizable growth of patient care revenues is due in part to organizational changes and the management and financial systems that accompanied them. As medical schools developed formal practice organizations for billing and collection, payment for patient care services that formerly was made directly to the individual faculty physician began to flow into the faculty practice plan and to be recognized as revenue to the school. Coincident with that was an increase in patient care reimbursements generally, particularly with the development in the mid-1960s of Medicare, federal health insurance for the elderly, and Medicaid, federal and state aid for the medically indigent. Until those programs were enacted, services to those groups provided by clinical faculty were largely unreimbursed.

Figure 3 • **Faculty Practice Plans Account for 70 Percent of Medical Service Revenue**



Source: 1990-91 LCME Survey

Tuition and student fees have remained a relatively stable component of medical school revenues at about 4 percent. From the perspective of the student, however, the increase in tuition necessary to maintain this level of support has been quite significant. The remaining sources of medical school revenues include private, industry-sponsored programs, foundation grants, gifts, and endowment income.

In the 1990s, medical schools face several threats to their traditional sources of funding. Of major significance and concern is the growing dependence of medical schools on revenues from the professional services of their clinical faculties. These funds have enabled programs to develop and expand in ways not otherwise possible, although these benefits have not been achieved without the perception of loss to the academic character of institutions. More importantly, continued growth of medical service income of the magnitude recently witnessed is unlikely, given government-mandated limits on physician fees and the increasing competition among health care providers.

Medical schools have been favored by the nation's growing commitment to biomedical and behavioral research, a phenomenon that dates back to the end of World War II. Growth of the federal research enterprise has slowed, however, and a burgeoning federal deficit makes substantial future increases in this source of funding also unlikely. Tuition and fees are stable sources of funding but appear to be set at the limits of affordability. Finally, revenues from state and local governments may prove to be the most uncertain of all. In 1992, state budget cutbacks have produced a severe strain on public medical schools and disrupted the financial planning of private schools that depend on state revenues for the support of key programs. Adapting to these fiscal limits and uncertainties represents a major challenge for medical schools in the years ahead.

Faculties

The number of full-time faculty members in U.S. medical schools totaled 74,621 in 1990-91. Although faculties continue to grow beyond the increments associated with the expansion of class size and the de-

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velopment of new medical schools in the 1960s and 1970s, this growth is now concentrated in the clinical disciplines (**Figure 4**). In large part, the faculty growth reflects the expanded involvement of medical schools in patient care activities and changes in faculty appointment policies. Physicians whose primary responsibilities are in patient care and teaching now tend to receive full-time status, even though their income is largely self-generated. In a former era, they might have been designated as voluntary or part-time faculty.

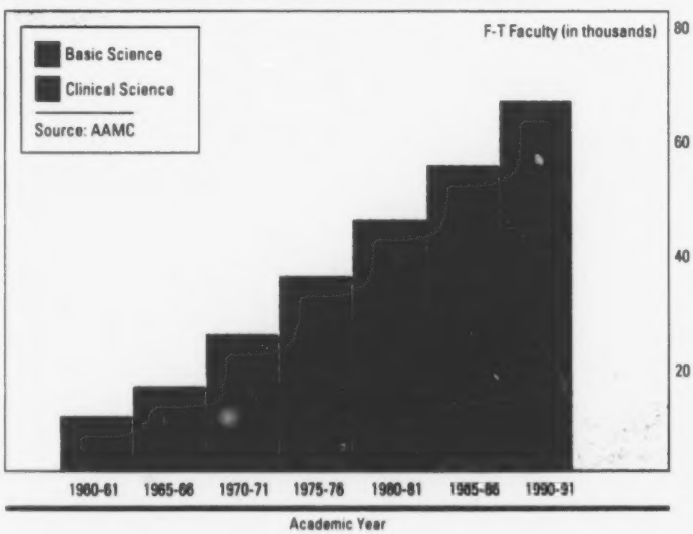
The cohort of faculty initially appointed during the years of medical school expansion is aging, leading to concerns about the impact of faculty aging on productivity. In 1991, 14 percent of medical school faculty members were 60 years of age or older, compared to only 6 percent a decade earlier. More than a third of the faculty are now 50 years or older. The implications of these data depend upon the retirement patterns of medical school faculty over the next decade. Beginning in 1994, federal law will prohibit institutions from involuntarily retiring tenured faculty solely on the basis of age. A mandatory retirement age of 70 is now permitted in most states. In eras of limited or no growth, faculty renewal depends heavily on openings created by retirement or other separations from faculty service.

One potential consequence of the elimination of mandatory retirement could be to hinder efforts at increasing the representation of women and minorities on medical school faculties. The proportion of women faculty members has grown slowly but steadily, from 16 to 22 percent since 1980, reflecting the overall increased presence of women in medicine. Moreover, the percentage of women medical school graduates who join the faculty of a U.S. medical school each year continues to exceed that of the men. Despite these advances, women continue to lag behind men in the proportions occupying the senior academic and administrative ranks — only 10 percent of full professors, 4 percent of department chairs, and two medical school deans. These figures cannot be explained simply by differences between men and women in career age. In contrast to women, progress in increasing the number of minorities on medical school faculties is significantly less evident. In 1990-91, only approximately 3 percent were from groups underrepresented in medicine (blacks, mainland Puerto Ricans, Mexican-Americans, and American Indians). Approximately one-fourth of these teach at historically black medical schools or those located in Puerto Rico.

In addition to demographic changes, medical school faculties over the last decade can be characterized by the increasing differentiation of their roles. The most obvious example is the increasing number of clinical faculty members with primary responsibilities for patient care and teaching. Nearly two-thirds of the medical schools have now created formal clinician-educator tracks to accommodate these appointments. Universities have also dealt with the expansion of patient care responsibilities of faculty by lengthening the standard probationary period for the award of tenure. Differentiation of roles is also reflected in the specialized areas of expertise needed by medical schools to advance clinical research; for example, information technology specialists working with clinicians to develop clinical databases and computer-aided diagnostic systems. Differentiation of faculty roles and the demand for specialists are likely to continue and to shape adaptations to traditional university appointment policies.

Women continue to lag behind men in the proportions occupying the senior academic and administrative ranks — only 10 percent of full professors, 4 percent of department chairs, and two medical school deans.

Figure 4 • **Faculty Growth Is Now Concentrated in Clinical Disciplines**

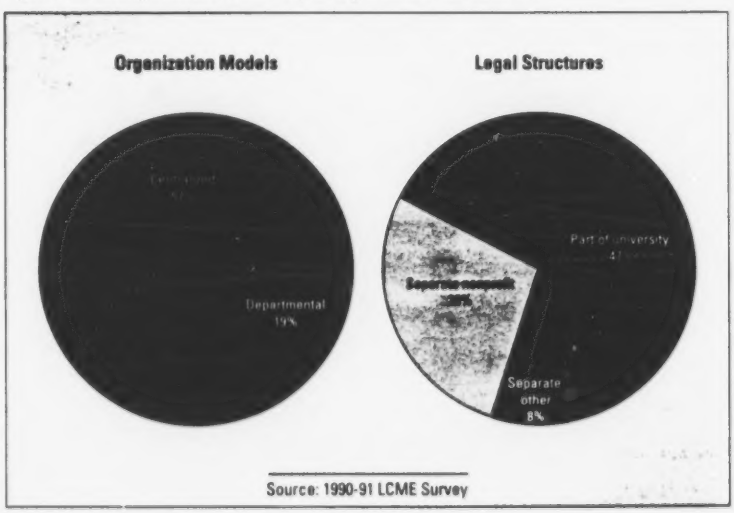


Faculty Practice Organizations

Increased involvement of faculties in patient care activities has spawned the development and expansion of the faculty practice plan within academic medical centers. In simplest terms, faculty practice plans are organized arrangements for billing, collecting, and distributing professional fee income. Their presence in academic medical centers has evolved over the last three decades: more than 70 percent of them were established after 1960. With the start of Medicare and Medicaid and the growth of third-party payer systems, faculty practice plans facilitated reimbursement to medical schools for the services rendered by clinical faculty. These reimbursements in turn have been used to support the salaries of faculty who contribute to teaching and research.

As the health care environment has grown more competitive, faculty practice plans have evolved more complex roles, beyond a simple focus on billing arrangements. These organizations have provided a basis for clinical faculty to organize the delivery of patient care into a comprehensive, multidisciplinary group practice, to construct ambulatory care centers and clinics, to negotiate contracts for services with managed care systems — health maintenance organizations (HMOs) and preferred provider organizations (PPOs) — and to join with hospitals in marketing services and contracting directly with large-scale purchasers of care. Each of these activities has been necessary for academic medical centers to preserve the patient base upon which teaching and research depend.

Figure 5 • **Faculty Practice Plans Vary in Organization and Structure**



Source: 1990-91 LCME Survey

Faculty practice plans have evolved different structural forms, depending upon local and historical factors (**Figure 5**). The centralized model, one with an overall governing board and central administrative structure, has become the most common, because it facilitates management decision making and enables the faculty group to be responsive to contract offers to provide a comprehensive range of services. Other practice organizations are either departmentally based, with governance and administrative functions individualized within departments, or have a federated character, that is, separate departmentally based practice arrangements with some limited common governance and management.

Faculty practice plans also differ in their legal relationship to the medical school. Nearly half are associations or divisions within the medical school or university structure. More than a third, however, are separate and independent legal entities, most of which are nonprofit corporations or foundations. Public medical schools are more likely than private schools to have practice plans organized as separate legal entities (60 percent versus 44 percent). Separate incorporation gives the faculty in public schools an independence and flexibility that may not be possible within the rigidities of state personnel and administrative systems but may be necessary to compete effectively for patients with other organized health care systems.

Teaching Hospitals

The resources represented by medical schools are complemented by a large number of teaching hospitals, the primary sites for clinical education of medical students and residents, postgraduate fellowship training programs, and a significant proportion of other health professions education programs. Teaching hospitals are distinguished also by their programs of clinical research: the testing and development of drugs, medical devices, and treatment methods. Many of the advances begun in basic research laboratories of medical schools and universities are incorporated into patient care through clinical research programs at teaching hospitals.

Teaching hospitals in the United States developed in response to the medical education reform movement at the turn of the century. At that time, most medical schools had no hospital affiliation, and

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among those that did, the extent of clinical training opportunities for students was quite variable. In 1910, three prestigious hospitals, Presbyterian Hospital in New York, Peter Brent Brigham Hospital in Boston, and Barnes Hospital in St. Louis, established affiliations with the medical schools at Columbia, Harvard, and Washington University, respectively. The prestige associated with medical-school affiliation and the development of teaching and research programs spurred others to do the same and, today, medical school-teaching hospital affiliations are standard.

Although approximately 1,300 hospitals are involved in medical education, more than three-fourths of the residents in the United States and nearly all medical students train in the 388 hospitals that are members of the AAMC's Council of Teaching Hospitals (COTH). COTH members include 287 short-term, nonfederal hospitals, 20 children's and 11 other specialty hospitals (for example, psychiatric and women's hospitals), and 70 VA medical centers.

The vast majority of short-term, nonfederal COTH hospitals (75 percent) are nonprofit institutions sponsored by tax-exempt, nonsectarian, or church-related organizations, with the remainder primarily government-owned, either by the state (13 percent) or city/county (11 percent). All have affiliation agreements with a medical school, which govern the relationship between the school and hospital and delineate respective responsibilities for the conduct of the educational programs. A subset of 123 COTH members has substantial ties to a medical school: 62 share common ownership with a medical school in a comprehensive or health sciences university; 6, now separately incorporated, shared common ownership until relatively recently; and 55 others, though separately incorporated, are closely linked by a long-standing tradition of joint appointments of medical school department chairpersons and hospital chiefs-of-service. Two of these hospitals, Humana Hospital-University of Louisville and St. Joseph Hospital (Nebraska), are owned or leased by for-profit corporations.

The programs at these 123 hospitals are not sufficient to provide the variety of educational experiences that medical students and residents require. For this reason, medical schools rely on a number of other major affiliated teaching hospitals, also COTH members, to supplement the training program. These include community-based hospitals. Children's hospitals, specialty hospitals, and VA medical centers add to the richness of inpatient clinical training opportunities.

Like all hospitals, teaching hospitals have been reviewing and modifying their structure and organization to meet the changing demands placed upon them. Both government and private payers of hospital services, in response to concerns about escalating health care costs, have demanded that hospitals become more businesslike and compete for patients on the basis of service and cost. Teaching hospitals have responded in several ways. As noted above, a few have successfully sought separate incorporation from their parent universities (and state systems), to escape onerous personnel and purchasing restrictions, to gain access to capital markets, and to achieve more responsive decision making and more efficient use of resources. Others have followed a strategy of vertical integration: developing or becoming a part of a larger health care system, including hospitals, clinics, nursing and rehabilitation centers, and physician groups, to provide various levels of care. As the health care delivery system becomes more corporate, this merging or consolidation of providers is likely to continue.

Ironically, for a subset of teaching hospitals, responding to the societal demand to become more businesslike has resulted in an attack on their tax-exempt status.

Ironically, for a subset of teaching hospitals, responding to the societal demand to become more businesslike has resulted in an attack on their tax-exempt status. The desire of government entities for additional sources of tax revenues has also fueled increased scrutiny. Teaching hospitals, however, continue to be distinguished from other hospitals by their public interest missions, reflected in the variety of ways these hospitals place community needs above financial or investment objectives. Examples of community service range from the subsidization of specialized services, for example, trauma centers, to meet regional and local needs, to the rendering of a disproportionate share of services to the poor and medically indigent. The teaching and research activities of these hospitals are further evidence of their broader role and unique status in society.

EDUCATION

The education of future physicians begins with the selection of qualified applicants to medical school, extends through a four-year program of medical student education, and continues through a three- to seven-year period of graduate medical education leading to eligibility for board certification. Both medical schools and teaching hospitals are involved with medical education in all its phases. A variety of mechanisms has evolved to ensure the quality of medical education and the competence of practicing physicians.

Admissions

Admission to medical school in the United States is selective, a practice that contrasts with the open enrollment policies of many other countries. Selective admission allows medical schools to admit men and women who, in the faculty's opinion, have the academic abilities and personal qualities requisite for a profession that is based on high standards of competence and service to others. By retaining the prerogative to select their students, faculties also can ensure that the number of matriculants matches the resources available for an optimal education.

"Providing young people from all racial and ethnic backgrounds with the opportunity to study medicine is not a choice, it is an obligation."

Robert G. Petersdorf, M.D.
AAMC President's Address, 1991

The criteria used by faculties in their selection process are broad-based. They include prior academic achievement, judgments by college faculty and advisors of the candidate's academic abilities and personal qualities, and evidence of values and attitudes commensurate with a career of service. Nearly all medical schools conduct personal interviews to assess the personal qualities, values, and attitudes of applicants, a practice that is rarely observed in business, law, and other professional schools.

The evaluation of academic abilities is aided by the AAMC-sponsored Medical College Admission Test (MCAT). Following an AAMC-conducted major national review and revision, this standardized examination now includes tests on the biological and physical sciences, verbal reasoning, and composition of a writing sample. The science concepts assessed by the examination are drawn from a list of topics that a panel of medical school faculty and practicing physicians has deemed essential to the study of medicine. Medical schools have made an effort to limit the college science course requirements for admission to medical school. This effort reflects the consensus that the study of medicine requires a science background but should not be restricted to those who major in the sciences. The introduction of a writing sample or essay in the MCAT serves to reinforce the importance medical schools place on a broad liberal undergraduate education for medical students.

Applicant Trends

The number of applicants to U.S. medical schools reached a historical peak in 1974, when 42,624 applied for 15,066 first-year positions, a ratio of 2.8 to 1 (**Figure 6**). The number then declined steadily to a low of 26,721 in 1988, but has since sharply rebounded, to an estimated 37,500 applicants for the 1992 entering class. The doubling of the applicant pool from the mid-sixties to mid-seventies was an outgrowth of burgeoning college enrollments during that period. The baby-boom generation had come of age, and Vietnam-era student draft deferments encouraged college attendance. Subsequent declines in the pool during the 1980s were a return to normalcy. Recent increases in the applicant pool may relate in part to the recessionary economy of the late 1980s and

early 1990s. Interest in graduate and professional education programs tends to rise when jobs are less plentiful.

The most striking long-term demographic trend in the applicant pool has been the increase in numbers of women, who constitute an estimated 42 percent of applicants to the 1992 entering class. The proportion of women in the applicant pool has increased every year since 1969, a trend that shows no sign of ending **(Figure 7)**.

Unfortunately, racial-ethnic minorities have not achieved the same success as women in entering the medical profession. The AAMC first identified the underrepresentation of minorities in medicine as a priority for action more than 20 years ago. In 1978, an AAMC Task Force on Minority Student Opportunities in Medicine expressed the view that expansion of the applicant pool was essential if more minorities were to enter medicine. Despite various initiatives in intervening years, blacks constituted less than 8 percent of medical school applicants in 1992. Other underrepresented minorities — American Indians, Mexican-Americans, and mainland Puerto Ricans — raise this proportion to just under 11 percent. Both figures are only slightly higher than those observed a decade earlier. Blacks constitute 12 percent of the population but only 3 percent of physicians. Mexican Americans are a little more than 5 percent of the population, yet are one its fastest growing segments. They constitute less than 2 percent of medical school enrollment. For these groups particularly, erasing a historic underrepresentation in the medical profession has been an elusive goal.

In 1991, the AAMC reaffirmed its long-standing commitment to make medical education accessible to all segments of society by inaugurating *Project 3000 by 2000*. Supported by a grant from the National Institutes of Health (NIH) and the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) Science Education Partnership Award Program, this project has the goal of nearly doubling, by the end of the twentieth century, the number of underrepresented minorities admitted each year to medical schools. The project focuses on the high school/college/medical school pipeline, a twelve-year educational continuum during which students' interest in and capacity for study of medicine either is enhanced or dissipates. Through *Project 3000 by 2000*, the AAMC is providing leadership and technical assistance to medical schools seeking to:

Figure 6 • **Interest in a Career in Medicine Has Rebounded**

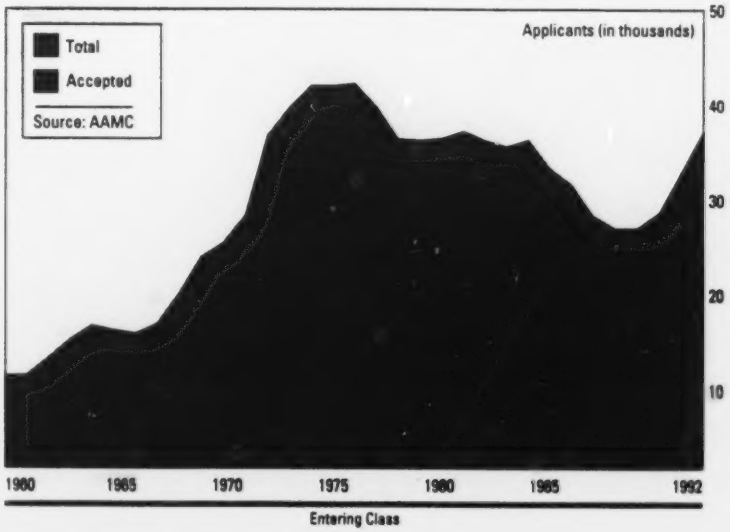
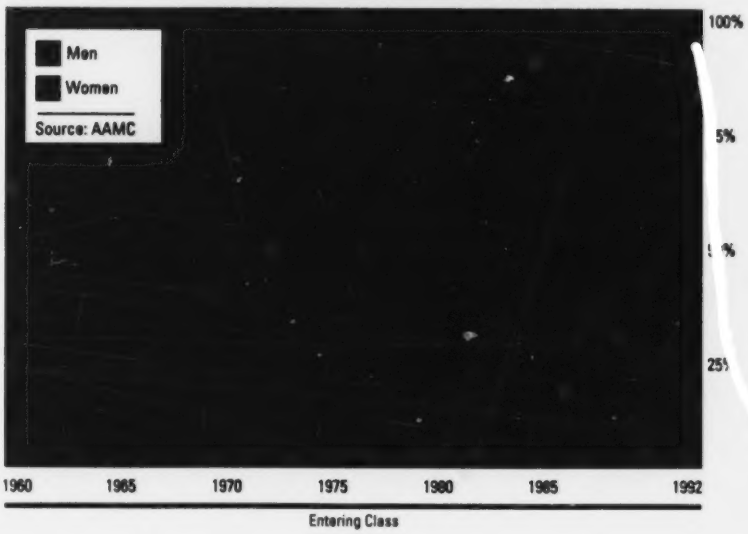


Figure 7 • **Women Now Constitute 42 Percent of Medical School Applicants**



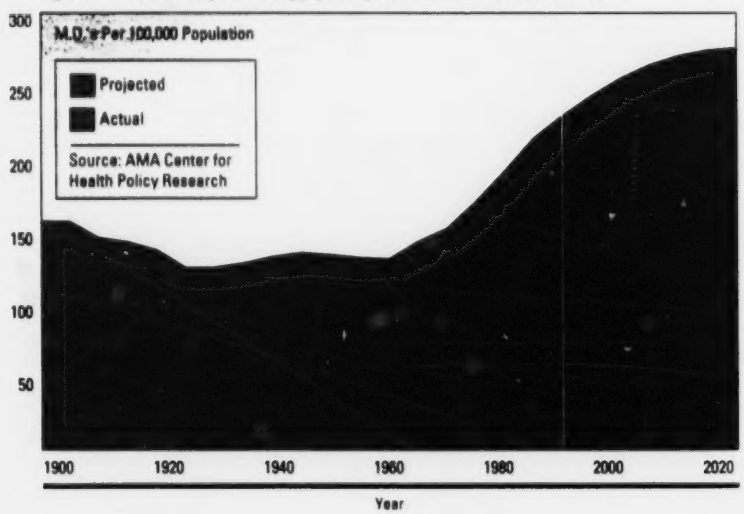
- form partnerships with local school systems and undergraduate colleges, including articulation agreements to minimize social, financial, and academic barriers that impede the progress of talented minority students from one academic level to another;
- support the development of rigorous magnet high school health professions programs in areas with large minority populations;
- track the progress of minority students who show a commitment to medicine in high school; and

- integrate all of the above with academic enrichment programs that medical schools have long administered to produce a comprehensive, well-coordinated strategy to increase underrepresented minority enrollment in medical schools.

Enrollment and Physician Supply

Medical schools vary in the size of the classes they enroll. The 1992 first-year enrollment of medical students is expected to range from 32 at one school to 300 at the largest multi-campus school, with an average first-year class size of 127 students. Nearly 16,000 students were expected to matriculate at U.S. medical schools in 1992. In that same year, schools graduated 15,365 students, somewhat fewer than the 16,343 graduates in the peak year of 1984. The 1992 graduating class is still about double the size of its counterparts during the 1960s and continues the increase in the ratio of physicians to population. After declining slightly in the first quarter of the twentieth century, this measure of physician supply remained fairly stable until about 1960 (**Figure 8**). The subsequent expansion of medical schools and class sizes then led to a rising spiral in physician numbers, particularly evidenced in the past two decades. Only a radical reduction of class sizes could forestall the inexorable growth in the physician-population ratio expected over the next three decades. By the turn of the century, the ratio will be nearly double what it was in 1960.

Figure 8 • **Overall Physician Supply Is Expected to Continue to Increase**



The consequences of these unprecedented numbers have produced sharp debate. Physician supply can be gauged quite accurately, but the future demand for medical services is uncertain. Those who view the numbers as a present or impending physician surplus predict a series of negative outcomes: increased health care costs, a result of physician-induced demand for services; atrophying of physician skills, a consequence of reduced patient load; and general dissatisfaction among physicians, a harbinger of the profession's impending decline. On the other hand, some point to developments that could readily absorb an increased supply of physicians: the aging of the population, the emergence of new diseases such as the acquired immunodeficiency syndrome (AIDS), the need to staff prevention and health promotion initiatives, and changes in social policy that extend access to medical care to those currently underserved.

An AAMC Task Force on Physician Supply concluded in its 1990 report that the overall supply of physicians did indeed appear ample for the foreseeable future, but that a chronic geographic and specialty maldistribution persists. In particular, it pointed to a national shortage of generalist physicians and to a shortage of physicians practicing in inner-city and rural areas. The distribution of physicians among specialties, types of practice, and geographic settings has now overshadowed physician numbers as the main focus of national policy debate.

Tuition and Student Financial Assistance

Medical schools aspire, as a matter of principle, to accept the most worthy candidates for admission, regardless of ability to pay. True equality of access to medical education requires that the cost of medical education not be a deterrent and that financial assistance be available to those in need.

The costs of attending medical school rose steeply beginning in the late 1970s, driven substantially although not entirely by the rapid inflation of that time. Increases in tuition and fees have continued through the 1980s and into the 1990s, but, in the last five years, these increases have just kept pace with inflation (**Figure 9**). Still, the median annual tuition at a private medical school was $19,038 in 1991-92; at a public medical school, $6,600 for state residents and $15,041 for nonresidents. The total

level of tuition and fees varies greatly among schools, however, from $1,654 per year for state residents at one public institution to $27,780 per year at a private institution.

Increasing costs have heightened the need for scholarship funds and low-interest, subsidized loans. In the 1980s, available scholarship money grew from $141 million to $186 million but failed to keep pace with inflation or with rising tuitions. Its proportional contribution to student financial assistance declined from 31 percent to 23 percent. Institutional funds accounted for $76.4 million, or 41 percent, of the scholarship funds awarded to medical students in 1990-91. Fewer than one out of every three medical students, however, received such assistance. The Armed Forces Health Professions Scholarship program accounted for $55.9 million, or 30 percent of scholarship monies, but these awards were targeted to fewer than 5 percent of all medical students. The National Health Service Corps program, which exchanges scholarship aid in return for future service in underserved areas, was reduced greatly during the 1980s. Only 64 students nationwide received aid from this source in 1990-91. More recently, appropriations for this program have increased and it may become a more significant source of financing.

Loans constituted the major portion of the $826 million in student financial assistance awarded in 1990-91. More than half of the total loan revenues, $319 million, was in Federal Stafford Loans. Because the federal government subsidizes the interest on these loans while the borrower is in school or in eligible deferment, the Federal Stafford Loan program has been students' first choice of loan funds. Two out of every three medical students borrowed money through the program in 1990-91. The Health Professions Student Loan (HPSL) and Federal Perkins (formerly National Defense) Loan programs, two smaller federally subsidized programs, each accounted for 5 percent of the loan awards in 1990-91. Most of the remaining loan requirements had to be met by programs not subsidized by the federal government, including the Health Education Assistance Loan (HEAL) program, with 16 percent of the loan activity, and the Federal Supplemental Loans for Students (SLS) program, with 11 percent. In these programs, the interest accrues to the borrower and is capitalized periodically during periods of enrollment or deferment, presenting medical students with a formidable debt upon completion of training.

In 1986 the AAMC introduced MEDLOANS, a comprehensive loan program that guarantees all enrolled medical students in good academic standing access to $30,000 of loan capital each year for the four years of medical education. MEDLOANS utilizes the existing Federal Stafford, SLS, and its own Alternative Loan Program (ALP), with terms and conditions that make it one of the least expensive, privately insured loans available for borrowing by medical students. MEDLOANS has eased campus administration of student financial assistance. Its desirable features for students include a single loan application, consolidation options pursuant to federal statute, and repayment geared to the earning patterns of physicians.

An AAMC Task Force on Physician Supply concluded in its 1990 report that the overall supply of physicians did indeed appear ample for the foreseeable future, but that a chronic geographic and specialty maldistribution persists.

The major consequence of rising tuition and fees, coupled with the failure of scholarship and grant revenues to keep pace and limitations on subsidized loans, is the growing indebtedness of medical school graduates. Among the class of 1992, 81 percent incurred some debt to finance their medical education. The median debt for indebted graduates of private medical schools was $68,000; for graduates of public

Figure 9 • **Increases in Tuition and Fees Have Recently Moderated**

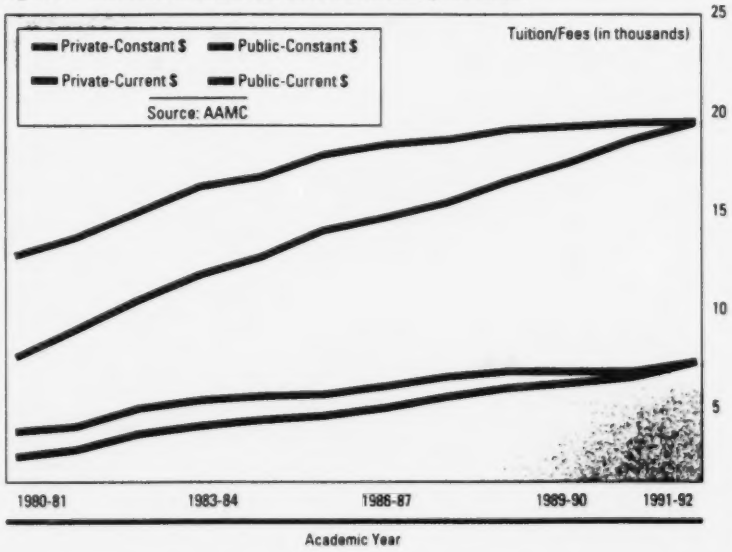
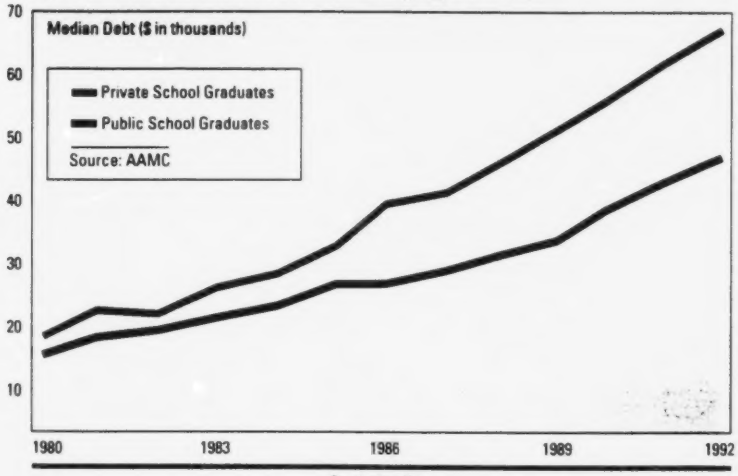


Figure 10 • **Medical Students Are Accumulating Significant Debt**



schools, $45,000 **(Figure 10).** A small percentage of students have debts of more than $100,000. Underrepresented minority students are more likely to leave medical school with debt and have larger debts than other students. Anticipating such debts may discourage minority students from even applying to medical school. Also, concern grows that, as debt increases, medical school graduates may increasingly direct their careers toward high-earning specialties and away from the more needed but less well-compensated generalist practices.

Educational Program and Curriculum Reform

Despite the tremendous changes in size, scope, and institutional context of medical education programs, the structure of the curriculum of most medical schools remains quite similar to that outlined by Abraham Flexner in his prescription for reform at the beginning of the twentieth century. In the first two years, medical students generally receive a solid grounding in the biomedical sciences of anatomy, biochemistry, physiology, and microbiology, followed by clinically relevant transition courses such as pharmacology, pathology, and introduction to clinical medicine. Courses in behavioral science are also standard. Integrated basic and clinical science topics, for example, genetics, immunology, molecular biology, cell biology, and neuroscience are covered as separate courses or parts of existing courses. Courses and seminars in public health/preventive medicine, epidemiology, geriatrics, and biomedical ethics complete the program of instruction.

The third and fourth years of the program are reserved for supervised clinical experiences — core clerkships, electives, junior internships, and externships — the sites for which traditionally have been the inpatient units of affiliated teaching hospitals. All schools require clerkships in internal medicine, surgery, obstetrics/gynecology, pediatrics, and psychiatry, and more than half require a clerkship in family practice or some other primary care experience. Students generally have the option to elect additional training opportunities. Upon satisfactory completion of this four-year curriculum, the student is awarded an M.D. degree. Graduating students are not considered to have the skills necessary for independent practice, however. A period of graduate training follows, which leads to certification in a chosen specialty or subspecialty.

Since Flexner, there have been periodic national reviews of the medical school curriculum, beginning with the 1932 report of the Rappeleye Commission and including the widely publicized *Physicians for the Twenty-First Century*, an AAMC-sponsored 1984 Report of the Panel on the General Professional Education of the Physician (GPEP) and College Preparation for Medicine. More recent national studies and reports have been sponsored by the Macy, Pew, and Robert Wood Johnson Foundations, and the American Medical Association (AMA). These reports reflect a remarkably broad consensus on desired changes in medical education. First is the need to improve institutional focus on medical student education. Second are the changes themselves required to prepare students to meet the demands of future medical practice. A recent AAMC study, *Assessing Change in Medical Education: The Road to Implementation (ACME-TRI)*, has concluded that most medical schools have been only modestly successful in implementing these reforms. A report of that study, *Educating Medical Students*, to be published in late 1992, suggests strategies to assist medical schools in overcoming or at least minimizing the barriers to change that have been identified.

Improving the Focus on Medical Student Education

The research discoveries of the post-war period gave rise to increased specialization in clinical medicine and the sciences basic to medicine. As a result, responsibility for both planning and implementing a program of education for medical students has traditionally been widely dispersed among medical school departments and faculty members. Medical student education competes for faculty time with the training of graduate students and residents within fields of faculty specialization and research. The result has been a dilution of the effort focused on general professional education.

Some schools have countered these influences by designating authority and responsibility for medical student education to specially created organizational units, directed by an interdisciplinary group of faculty, with resources budgeted for this purpose. These units are charged with developing and securing faculty approval for a comprehensive set of educational objectives, designing an integrated and coordinated program to meet those objectives, drawing on departmental and faculty expertise to implement the various parts of the program, and selecting methods for the evaluation of students against the objectives and for the evaluation of the curriculum itself. By designating authority and responsibility in this way, medical schools avoid the problem of medical student education being merely a byproduct of other faculty activities. This strategy also helps to ensure that students will complete a coherent program of general professional education, better preparing them for the next phase of their medical education.

Schools have also redirected faculty energies more toward medical student education by changing the academic reward system to give greater attention to teaching. Traditionally, achievements in research have been the key to academic advancement. While that is still largely the case, medical schools now more frequently demand evidence of the quantity and quality of teaching in promotion and tenure reviews.

Implementing Curriculum Reform

The challenges medical schools face as they seek to reform medical education appear in four general areas: updating the content of curricula in response to new scientific understanding and technology, changing populations, and changing health care needs; improving teaching and learning; integrating advances in information technology and medical informatics into medical education programs; and changing the sites for clinical education and the nature of the clinical training experience.

Content of Curriculum. Patterns of mortality and morbidity have shifted dramatically in the latter part of the twentieth century. Vaccines, antibiotics, and improvements in public health and sanitation have largely eradicated the infectious diseases that earlier accounted for most premature deaths. Much of the focus of medical care has taken a decided turn from the young to the old and from acute to chronic conditions. Physicians in the future will increasingly treat problems of aging, including Alzheimer's disease, chronic neurological diseases, heart and circulatory failure, and bone and joint disorders. Curriculum design for medical education programs must take into account these changes. Serious afflictions of the young and middle-aged remain — infant mortality, drug abuse, cancer, and AIDS, to name just a few. Many of these health problems are embedded in culture and lifestyle and need to be understood in an overarching biopsychosocial context. Most observers believe that medical education must focus more on prevention of disease, on health promotion, and on population-based approaches to health care.

Physicians in the future will increasingly treat problems of aging, including Alzheimer's disease, chronic neurological diseases, heart and circulatory failure, and bone and joint disorders.

None of this lessens the importance of basic science and technology in the medical school curriculum. Indeed, advances in molecular biology in the last quarter century — nothing less than evolutionary leaps in knowledge — raise the possibility of understanding the genetic basis of a host of degenerative and disabling diseases and may transform therapeutic approaches. Technologies developed from these and other basic science investigations continue to expand the medical armamentarium of physicians and challenge schools to improve the integration of basic and clinical science instruction.

For physicians and the public, improved medical technology and capability are dual-edged, improving and extending life but usually adding to health care

costs and posing moral dilemmas. Physicians can no longer afford to ignore the financial consequences of diagnostic tests and treatment decisions. Medical educators are now teaching medical decision making, that is, evaluating the costs and benefits of various treatment options on the basis of controlled studies of patient outcomes. Medical ethics continues to be a prominent part of physician training as new technology introduces further moral quandaries for physicians, patients, and the families of patients.

Finally, whether caring for chronic diseases of the elderly, educating in prevention, counseling about new medical technologies, or dealing with the ravages of the AIDS epidemic, physicians must be well-skilled in communicating with patients. Patient dissatisfaction with physicians is in large measure related to deficiencies in communication. The skills required are effective listening and understanding of patient complaints, sequenced and logical interviewing about the nature of symptoms, fostering patient understanding and informed and participative medical decision making, and counseling and educating patients and families. A comforting word and healing touch were once virtually all that medicine could offer. The revolutionary advancements since that time have not diminished the importance of communication in the physician-patient relationship.

"Self-paced, student-directed learning with specific outcome measurements should be our goal, with the physician becoming the model of the lifetime learner."

D. Kay Clawson, M.D.
AAMC Chairman's Address, 1989

Approaches to Learning. Medical educators agree that learning must be an active process, that problem-solving and reasoning skills must be fostered, that biomedical sciences must be taught not as disembodied facts but as the conceptual basis for understanding clinical phenomena, and, most importantly, that habits of self-directed, independent learning that prepare students for a lifetime of continuing medical education should be developed. The struggle has been how best to achieve these goals.

Lectures continue to serve as the mainstay of instruction in the first two years, but medical schools have decreased the time students spend in lectures and have attempted to introduce more opportunities for small-group learning. Computer-assisted instruction (CAI) programs are used to supplement teaching of basic and clinical science topics. Interactive programs that take advantage of advances in graphic imaging are now readily available for teaching the basic sciences, including anatomy, physiology, pharmacology, and pathology. Other programs simulate clinical encounters with patients and teach diagnostic skills and medical decision making with a focus on treatment costs and outcomes.

A promising new approach to medical student learning is the problem-based curriculum. This refers to a student-centered, small-group approach in which basic and clinical science topics are introduced in the context of patient problems. Discussion of these cases is supplemented by independent research, reading materials, and occasional lectures and demonstrations. Problem-based learning is valuable for enhancing skills in hypothesis development and deductive reasoning and for fostering group communication skills that are required of health care professionals working within teams. Problem-based learning requires a radical shift in educational paradigm — from a disciplinary to interdisciplinary context, from the teacher as expert to the teacher as facilitator, from a large- to small-group learning context. Only about 10 percent of medical schools currently use problem-based learning as an organizing principle for their medical education programs. The AAMC sponsors a workshop designed to introduce schools to this approach to curriculum design, which is beginning to gain more adherents.

Advances in Medical Informatics. Computer-assisted instruction and problem-based learning are both facilitated by advances in information technology. The storage, retrieval, and management of information are essential functions in the support of medical problem-solving and decision making. In the past, the knowledge base of medicine was stored in textbooks and journals and patient information in hospital and office records. Physicians were expected to use their memories to make correlations between information in the literature and information about their patients and reach diagnostic and therapeutic decisions. Most physicians and students continue to use this memory-dependent mode of decision making. They will need to change their behavior to take advantage of the

computer technology, databases, and expert systems available to hospitals and physician offices, and others coming on-line within the next decade.

The National Library of Medicine (NLM) has been a leader in efforts to advance medical informatics, the rapidly growing field that deals with the storage, retrieval, and use of biomedical information. Beginning as early as 1972, the NLM has supported the training of nearly 400 individuals, more than half of whom hold academic positions. Since 1983, the NLM's Integrated Academic (now Advanced) Information Management System (IAIMS) program has provided funds to 16 academic medical centers. IAIMS has the objective of developing models for linking library systems with other academic, clinical, and financial information systems in academic medical centers. These integrated networks support education, research, patient care, and administration. After a decade of experience, IAIMS is now expanding its objectives to take advantage of the federal government's High Performance Computing and Communication Initiative (HPCC), which dramatically enriches the possibilities of information transfer. Problems to be addressed by HPCC that are relevant to academic medicine include transmission of digital images, intelligent gateways to retrieve information from several life sciences databases, and innovations in educational techniques.

The Association has supported the advancement of medical informatics and now provides an ongoing seminar for schools interested in learning about the latest innovations in this area. Medical schools have been active in sharing information about programs and software at other AAMC-sponsored meetings. Institutional leadership, faculty commitment, and financial resources to support new systems and software are needed for continued progress in this area. By the end of the century, physicians, residents, and students may commonly use computers to access patient records, medical literature, and medical databases, and may rely on expert systems as aids in patient diagnosis and therapeutic interventions.

Sites for Clinical Education. The inpatient services of the nation's teaching hospitals have traditionally been the sites for the clinical education of medical students and residents and for very many years provided an ideal educational milieu. Medical students have been able to observe, discuss, and participate in diagnostic and therapeutic activities in the company of and supervised by residents, fellows, and faculty physicians. Residents and fellows in turn have assumed greater responsibilities for patient care and have contributed to the education of medical students. The concentration of students and residents in a small number of inpatient settings has allowed close supervision by department and division leaders. Because of the availability of the patient throughout the period of hospitalization, inpatient educational programs have been efficient as well as effective. Teaching at the patient's bedside has been conducted for groups of students at specified times in the teaching physician's schedule.

Medical schools are seeking creative ways to involve not only hospital-related ambulatory clinics but physician offices, family medicine centers, geriatric centers, community-based centers, indigent care centers, and rural clinics in the clinical education of medical students.

Several factors now conspire to make inpatient services less ideal as educational sites, particularly for the training of medical students. Technological advances in various specialties and the financial incentives inherent in managed care systems have narrowed the scope of medical conditions for which patients are now hospitalized. Those who do receive hospital care tend to stay for a shorter period, with much of the initial diagnostic workup and post-treatment follow-up occurring in the ambulatory setting. As a result, medical students now have little time to get to know hospitalized patients, to study their medical conditions, and to follow the course of treatment and care. They also see little of the early stages of illness and disease. The patients themselves suffer from more acute and complex illnesses, which bear little resemblance to the medical conditions students will confront later in the office or clinic setting.

The need to extend clinical training further into the ambulatory setting has been a consistent theme of AAMC-sponsored conferences, symposia, and meetings in the last decade. Medical schools are seeking creative ways to involve not only hospital-related ambulatory clinics but physician offices, family medicine centers, geriatric centers, community-based centers, indigent care centers, and rural clinics in the clinical education of medical students. These settings provide a more representative patient population and may enable a stronger educational focus on physical

examination and history-taking; patient management and continuity of care; understanding the social, psychological, and cultural aspects of disease and disability and their implications for care; communication with patients and their families; and consideration of ethical questions.

The accommodation of medical student and resident education to outpatient settings has not been without problems. The managed care, competition model that describes much of modern-day health care places a premium on efficiency and productivity in the delivery of patient services. The presence of medical students, particularly, may detract from these objectives, because the time and effort required for their training outmatches the contributions they can make to delivering care. For this reason, with some notable exceptions, health maintenance organizations (HMOs) have been reluctant to accept students for training purposes. Nonetheless, nearly all schools include some ambulatory training as part of the clinical program in the third and fourth years and in graduate medical education programs. At many schools, a student's experience with ambulatory care is coincident with experience in primary care, for example, in a family practice center, local community or rural clinic, or office practice with community physicians as preceptors. Other clerkships — for example, in medicine, pediatrics, and surgery — are increasingly dividing time between inpatient and outpatient settings. As new teaching models in these various settings are developed and gain acceptance, and as financial issues are resolved, education of both medical students and residents is likely to be conducted increasingly outside the traditional hospital ward.

Graduate Medical Education

Graduate medical education — residency and fellowship training — varies in length from three to seven years and is essential for preparing physicians for independent practice. The complex and elaborate process by which medical school graduates secure residency positions is facilitated by the National Resident Matching Program (NRMP), a computerized process that links student choices for graduate training programs with available positions and preferences of program directors for candidates. The AAMC manages the NRMP under contract to its independent governing board.

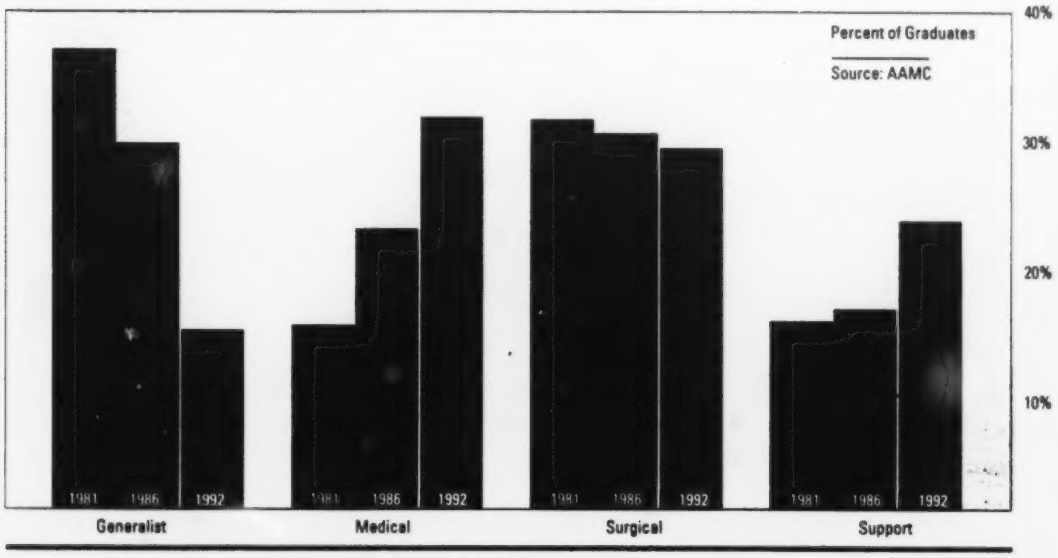
In 1992, 14,030 fourth-year students at U.S. medical schools sought graduate training through the NRMP, with 12,957 or 92 percent successfully matched to a program of their choice. The NRMP also facilitates the matching of foreign medical graduates, Canadian school graduates, osteopathic medical school graduates, and other physician candidates to graduate medical education programs. The number of residency positions offered each year surpasses the number of candidates. For example, in 1992, 20,294 first-year residency (PGY-1) positions were offered through the NRMP, but 1992 graduates of U.S. medical schools filled only 64 percent of the positions. Other applicants filled another 16 percent of the positions, leaving approximately 20 percent of positions unfilled.

The percentage of filled positions by specialty is one indicator of the attraction different specialties have for U.S. medical students and other applicants. In 1992, the specialties of orthopedic surgery and diagnostic radiology filled nearly all first-year residency positions offered. Family practice has been one of the specialties whose percentage of positions filled is the lowest. Only two-thirds of the first-year residency positions offered in family practice were filled in 1992.

The Generalist Imperative

Specialty choices of graduates have come under close scrutiny as a consensus develops that the nation suffers from a shortage of generalist physicians. Generalist physicians — those practicing family medicine, general internal medicine, or general pediatrics — are viewed increasingly as critical in addressing the problems of access to health care and containment of costs. Yet, little more than one-third of all active physicians can be classified as generalists, far less than the 50 percent ratio that the federal Council on Graduate Medical Education (COGME) and other observers see as ideal. More ominous is the finding that the interest of graduating seniors in generalist specialties has declined since the early 1980s, from 38 percent to less than 15 percent (**Figure 11**). Interest in surgical specialties has remained fairly constant, while interest in medical and support specialties has increased. Medical specialties include family practice subspecialties, internal medicine subspecialties, pediatric subspecialties, psychiatry

Figure 11 • **Interest of Medical School Graduates in Generalist Careers Has Waned**



and neurology and their subspecialties, allergy and immunology and subspecialties, and dermatology and its subspecialties. Support specialties include anesthesiology and its critical care subspecialty, emergency medicine, nuclear medicine, pathology and its subspecialties, physical medicine and rehabilitation, preventive medicine and public health, and radiology and related subspecialties.

The inability of medical schools to produce more generalist physicians has understandably frustrated state and federal government policy makers. Medical students, however, respond to incentives in the system, a number of which — higher income, greater social prestige, more controlled lifestyle — render careers in specialty practices quite attractive. The AAMC formed a Generalist Physician Task Force in 1992, based on its belief that medical schools have a clear societal obligation to improve the generalist-specialist mix of physicians in practice. The Task Force has responded by calling on the AAMC to mount a nationwide effort to underscore the need for more generalist physicians, to challenge other bodies in academic medicine to develop their own initiatives, to advocate for public policies supportive of generalism, and to continue monitoring progress of its efforts.

The Task Force has called also on medical schools to provide academic recognition for scholarship, teaching, and role modeling of faculty in generalist specialties, to foster research opportunities and curricular experiences for students in generalist fields, and to involve generalist faculty more in key planning and administrative committees. Other strategies for medical schools are to involve more community-based generalist physicians in academic programs, to focus admission criteria toward applicants likely to pursue generalist careers, and to consider financial incentives in the form of scholarships, loans, and loan-forgiveness programs for those committed to generalist careers. The Task Force also suggested that strategies directed at influencing graduate medical education programs through funding mechanisms be evaluated and supported changes in physician payment. In the coming years, medical schools will be under increased scrutiny by public policy makers for their success in reversing the current decline of interest in generalist careers. Failure to reverse this decline through a voluntary restructuring of programs and development of incentives may invite more directed governmental intervention.

"[T]he Association of American Medical Colleges ... advocates as an overall national goal that a majority of graduating medical students be committed to generalist careers (family medicine, general internal medicine, or general pediatrics) and that appropriate efforts be made by all schools so that this goal can be reached within the shortest possible time."

AAMC Generalist Physician Task Force, 1992

Financing Graduate Medical Education

Financial support for graduate medical education is derived largely from hospital revenues through charges to patients and third-party payers, including the Medicare and Medicaid programs. The practice is justified by the services residents provide to patients as they learn and the need for an ongoing investment in physician education to ensure a continuing supply of qualified physicians. Medicare's share in the direct costs of graduate medical education — for resident stipends and benefits, faculty supervision, teaching space, supplies, and allocated overhead — is based on historical costs adjusted annually for inflation. Its reimbursement covers the period necessary for residents to complete the educational requirements for primary board eligibility plus one additional year, with a limit of five years. Thereafter reimbursement is limited to no more than 50 percent of its share of costs.

Price has become a determining factor in contracting for health care services by the private sector, which is increasingly reluctant to accept educational costs as its responsibility.

In 1984 an Association committee conducted a major review of the status of graduate medical education financing. After a thorough examination of various alternative methods, including a proposal to establish a separate fund for this purpose through some form of taxation, the committee concluded that teaching hospital revenues from patient care payers should continue to be the principal source of support for graduate medical education. While Medicare and, in most states, Medicaid continue to provide some support for graduate medical education through hospital payments, the commitment in the private sector has waned. Large-scale purchasers of medical services, intent on lowering health care costs, now tend to seek negotiated contracts for defined packages of services. Price has become a determining factor in contracting for health care services by the private sector, which is increasingly reluctant to accept educational costs as its responsibility.

Periodically, Congress has considered proposals to weight Medicare payments to hospitals for graduate medical education differentially based on specialty. This is seen as a strategy for influencing specialty distribution, particularly the training of more generalists. Hospitals would be paid more for residents in generalist training programs, and less for residents in other training programs. As data on filled PGY-1 positions indicate, however, the dearth of generalists is not a matter of too few residency positions or training programs: currently 13 to 32 percent of residency positions in generalist training programs go unfilled each year. Incentives are needed but may be better directed at students to increase their interest in these specialties.

The current financing structure, however, may not adequately facilitate the incorporation of non-hospital training opportunities in graduate medical education programs. Such opportunities, which may include service in ambulatory clinics, family medicine centers, geriatric clinics, physician offices, etc., are key to broadening the focus of training and promoting interest in generalist practice. The AAMC's Generalist Physician Task Force has called on the Association to review its current policies related to financing graduate medical education in light of the need to restructure the graduate medical education program and promote interest in generalist practice.

Resident Hours and Supervision

A further issue confronting institutions sponsoring graduate medical education programs is the concern about working hours of residents and provisions for supervision of their activities. The term *resident* is derived from the fact that historically physicians in training were expected to live in the hospital. They were responsible for patients 24 hours a day, seven days a week. Although these austere requirements have been relaxed greatly, residents typically are on duty in excess of 70 hours per week, including those during which they are "on call." In a few programs and specialties, residents have been expected to be available for duty for even longer periods of time. There is concern that the intensity of the workload, together with inadequate supervision, may be compromising the quality of patient care in teaching hospitals.

In 1988 the Association adopted a series of recommendations for changes in residency programs. Among these were support for a maximum 80-hour work week averaged over four weeks and provisions

for graded supervision of residents leading to the ability to make independent patient care decisions. The Association has called for greater emphasis on the supervision of residents, particularly in the early years of training. Were a sharp reduction in resident hours mandated by state law or regulation, hospitals would have to adjust their staffing requirements to meet existing service needs, with attendant financial implications.

Evaluation and Standards

Throughout this century an intricate network of accreditation bodies, licensing authorities, and specialty certification boards has developed to provide assurances that physicians in practice have acquired the requisite knowledge and skills to practice medicine safely and competently. For U.S. medical school graduates, this evaluation begins with the careful and selective process by which each student is admitted to medical school and continues with the ongoing assessment by medical school faculty of the student's satisfactory progress through the educational program. Faculty observations and judgments regarding the clinical skills and competence of medical students are particularly important in the award of the M.D. degree, which indicates a readiness to enter graduate medical education. These same faculty members are involved in assessing the clinical skills of residents in the course of their graduate medical education program.

Accreditation and Licensure

The Liaison Committee on Medical Education (LCME), jointly sponsored by the AAMC and the American Medical Association (AMA), accredits programs of medical education leading to the M.D. degree. LCME accreditation means that medical schools in the United States and Canada meet the standards for organization, function, and performance that ensure that graduates are qualified to undertake the next (residency) phase of medical education. The LCME conducts regular surveys of U.S. and Canadian schools for these purposes.

Similarly, the Accreditation Council on Graduate Medical Education (ACGME), of which the AAMC is a sponsor, is charged with determining the essential requirements of graduate medical education programs and ensuring institutional compliance in the conduct of graduate medical education programs. Discipline-based Residency Review Committees (RRC) complement these general requirements with a review of programs based on specific training requirements determined for each specialty. The involvement of specialty boards in the determination of residency program requirements is appropriate because these boards certify physicians as meeting certain standards based in part upon satisfactory completion of an acceptable training program.

While the efforts of these voluntary agencies are invaluable in ensuring physician competence for practice, the legal authority to grant a license to practice medicine rests with 54 different state and jurisdictional licensing authorities. The requirements to obtain a license to practice medicine are not uniform among these jurisdictions, but at a minimum they include the completion of an acceptable educational program, successful passage of an external examination, and, in all but three jurisdictions, at least one year of graduate medical education. Beginning in 1994, the external examination required of all candidates for licensure, whether graduates of accredited U.S. schools or of foreign medical schools, will be the three-part United States Medical Licensing Examination (USMLE). The USMLE replaces a multiple examination system that effectively produced separate pathways to licensure for U.S. and foreign medical graduates.

Uncertainty about the quality of education received by some foreign medical graduates has prompted many jurisdictions to impose additional requirements at the interface between medical school and residency. Foreign medical graduates seeking entry to accredited graduate medical education programs, participation in which is required for licensure, must first obtain a certificate awarded by the Educational Commission for Foreign Medical Graduates (ECFMG). This certificate is now based upon satisfactory completion of the first two parts of the USMLE, an English language proficiency requirement, and complete documentation of specified medical credentials.

Although the array of agencies, associations, and authorities involved in these processes may appear bewildering to the lay public, their respective roles and interrelationships are based on several principles:

the need for multiple agencies to provide checks and balances on assessments of the competence of individuals and the quality of programs, the desire to complement standardized paper-and-pencil evaluations of physician knowledge with judgments of clinical skills based on observation by experienced physician-educators, and the assurances provided by completion of a documented and accredited program of studies and supervised clinical experiences.

Assessing Clinical Competence

The most pressing challenge facing evaluators is to develop a reliable and valid means to assess the clinical skills of medical students, residents, and practitioners seeking professional licensure or relicensure. Standardized written examinations of clinical knowledge are prevalent but are insufficient measures of true clinical competence, which includes the ability to conduct a patient interview, perform a physical examination, make diagnostic and treatment decisions, and communicate with and counsel patients and their families. Faculty of accredited U.S. schools observe and assess the clinical competence of students as they progress through clerkships, but there is no mechanism for making comparisons at a national level. A standardized clinical examination would facilitate such comparisons, thereby providing important information to accrediting bodies as well as to the individual schools. It would also provide assurances on the readiness of foreign medical graduates for residency training and would aid in certifying the continuing competence of physicians in practice.

Two promising directions for improved clinical assessment are computer-based examinations (CBX) and performance-based examinations using standardized patients.

Two promising directions for improved clinical assessment are computer-based examinations (CBX) and performance-based examinations using standardized patients. CBX involves computerized simulations of patient encounters, in which the examinee is able to obtain a medical history and physical examination, order tests, consult with other specialists, and diagnose and treat the condition. The physiologic parameters of the patient change over time because of disease progression and examinee intervention. The National Board of Medical Examiners (NBME) has provided leadership in the development of CBX. It has developed more than 200 CBX cases and engaged more than 75 medical schools in the evaluation of the testing method. These schools are actively using CBX cases for instruction as well as for assessment, because the cases expand and enrich the clinical experience of students. CBX cases may eventually be used in the licensure and certification processes.

Performance-based examinations using standardized patients offer another means of ensuring clinical competence. These assessments are characterized by direct observation of the examinee in a patient encounter, using lay people carefully selected and trained to simulate accurately the emotional and physical complaints of actual patients. Standardized patients in medical education were introduced as early as the 1960s but have gained a foothold in medical education only in the last decade. Currently, nearly three out of every four medical schools use this technique in some fashion to teach or evaluate medical students. The AAMC plans to sponsor in 1992 a consensus conference on the use of standardized patients for teaching and assessment in medical schools.

In performance-based clinical examinations using standardized patients, examinees are evaluated by direct observation, videotapes of the encounters, responses to questionnaires, and reports by the standardized patients themselves. The examinations represent an investment in time, training, and resources. Planners need to consider how to make the implementation of performance-based examinations cost-effective and feasible, perhaps as a cooperative program among organizations and institutions and conducted on a regional basis. The Association has recognized the potential of performance-based clinical examinations and has joined with the ECFMG, the NBME, the AMA, and the American Board of Medical Specialties (ABMS) in a Clinical Skills Assessment Alliance, which seeks to design a program to be implemented across the country.

BIOMEDICAL AND BEHAVIORAL RESEARCH

Academic medical centers have provided the creative investigators and intellectually fertile environments that have so remarkably advanced the understanding and treatment of diseases over the last half-century. These institutions have contributed to the nation's preeminence in research in the biomedical and behavioral sciences. As the nation enters an era marked by a federal deficit growing exponentially, however, the cost of biomedical and behavioral research has become a concern of those charged with the stewardship of public resources. Opportunity continues to outstrip resources, and essential questions confront Congress, the Administration, and the academic and scientific communities about priorities for targeting limited funds.

Research Support

For most of the 1960s and 1970s, the federal government accounted for approximately 60 percent of the national annual investment in biomedical and behavioral research and industry only for approximately 25 to 30 percent. This situation was the consequence of a major federal investment in biomedical research that began at the end of World War II. Contributions by private industry to research funding accelerated in the 1980s, spurred by advances in biotechnology, pharmaceuticals, and medical instrumentation. By 1990, of the $22.6 billion in total expenditures for research, approximately 46 percent was funded by private industry, 44 percent by the federal government, and 10 percent from other sources, including private, nonprofit foundations and agencies.

The foci of federal government and industrial sources of research funding remain relatively distinct. Industry tends to concentrate on applications and development, with the bulk of its investment spent in private commercial laboratories. The federal government is the chief sponsor of basic biomedical and behavioral research, which is conducted primarily by academic institutions or in federal laboratories.

Although medical schools have initiated some partnerships with industry, the main sponsors of faculty research have been federal agencies. In 1990, U.S. medical schools reported receiving sponsored research funding of $3.4 billion, approximately $2.6 billion (76 percent) of which was provided by the federal government. The NIH, which accounts for 73 percent of all federal health sciences research funding, was the single major source. As a result, the funding patterns for this federal agency have been a focus of intense interest by AAMC member institutions. In the 1950s and 1960s, annual growth in NIH appropriations was appreciable (more than 20 percent after inflation). In the 1970s growth in support continued, but in more modest terms (approximately 5 percent per annum). In the 1980s, the size of funding increases diminished considerably.

> "[T]here is no natural law or categorical imperative for the support of science with public resources...the federal presence in science is a matter of public policy, with all the uncertainties that implies."
>
> *David H. Cohen, Ph.D.*
> *AAMC Chairman's Address, 1990*

Project Grants

The predominant mechanism for NIH extramural research support is the investigator-initiated research project grant, whether awarded as a traditional project grant, program project grant, or career development award. These grants constitute 75 percent of funds awarded, with targeted research programs supported by contracts getting the remainder. NIH funding for research project grants grew in the 1980s, although this growth just kept pace with inflation in the latter

NIH Research Project Funding in the 1980s

Figure 12 • **Funding Grew**

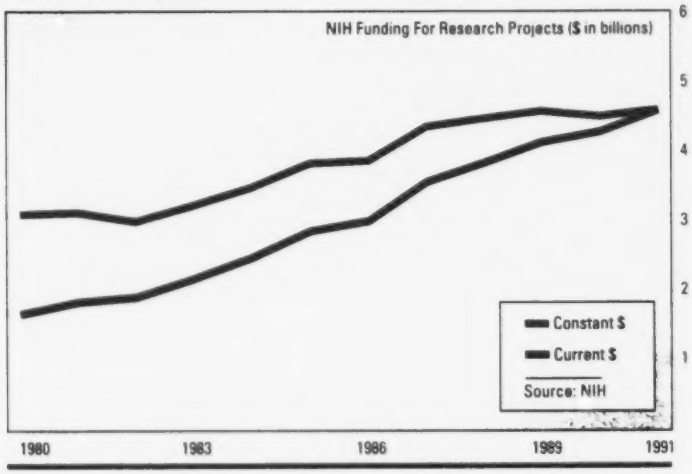


Figure 13 • **Size and Length of Research Project Grants Increased**

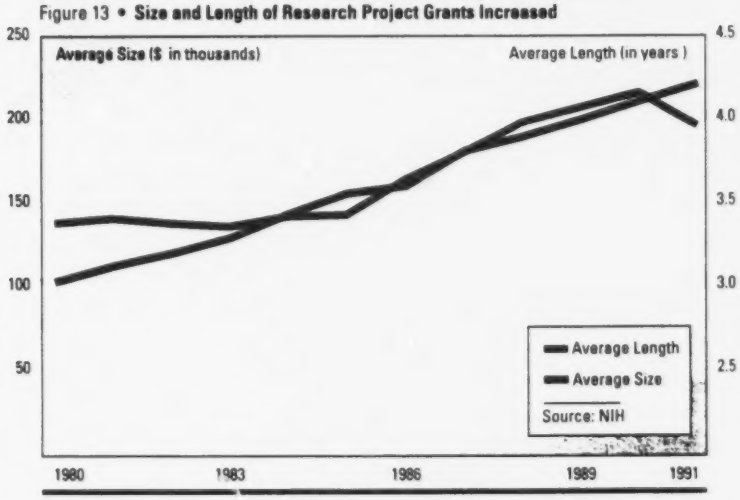
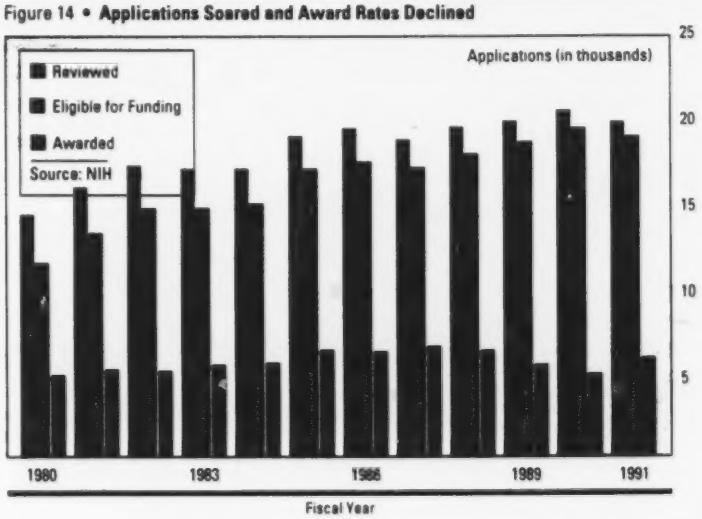


Figure 14 • **Applications Soared and Award Rates Declined**



part of the decade (**Figure 12**). Despite this, individual investigators competing for project grants have complained of a crisis in research funding. Researchers have seen the probability of being funded by NIH decline during the 1980s, from 32 percent to 24 percent of all applications reviewed. At least three factors have contributed to this decline: the increasing costs of individual research grants, an increased prior commitment of research funds because of lengthening of project awards, and a steep rise in the number of high-quality applications.

The average size of research project grants awarded to individual investigators doubled in the 1980s (**Figure 13**). The increase has been explained by higher personnel costs, the use of more sophisticated equipment, and expenses related to satisfying an increasing number of regulations placed on the conduct of biomedical research. More dollars per grant mean that fewer grants can be awarded.

Also, beginning in the mid-1980s, NIH began to increase the length of research awards, from just over three years on average to in excess of four years (**Figure 13**). Investigators themselves stimulated that policy change. Researchers who were not burdened by the continual preparation of applications could devote more time to the conduct of research itself. The long-term commitment to these awards, however, soon reduced the number of new awards that could be funded in a given year.

Finally, applications to NIH for funding have risen dramatically, from approximately 14,000 in 1980 to more than 20,000 in 1990 (**Figure 14**). The figures ironically attest to the success of biomedical research enterprise: research discoveries have created a time of unprecedented scientific opportunity, and an increased number of investigators — many medical school faculty — were poised and ready to exploit it. The result has been an intense competition for funding that has fractionated the research community and injected more than the usual uncertainty into the career planning of talented young researchers, who are the lifeblood of the enterprise.

Congress, the NIH, and ADAMHA, another important source of funds for behavioral science investigations, have attempted to accommodate the concerns of the research community by setting numerical targets for new and competing grants to be awarded each year. The success of this stabilization policy,

initiated in 1981, was at the cost of funding projects below their recommended budget levels, a process known as "downward negotiations." In 1990, NIH attempted further to contain the costs of research grants and fund greater numbers of grants by introducing a financial management plan that was intensely debated within the research community. The agency has since gone further in initiating a broad-based strategic planning process, with ideas and opinions gathered from researchers across the country. It is still too early to judge the effectiveness of the NIH strategic planning process or its outcomes. Establishing priorities for research is particularly difficult at a time when scientific opportunity in biomedicine may be at an all-time high. The financial realities require difficult decisions, however, and a planning process may allow appropriate consideration of new and pressing issues for clinical research, for example, women's health, in the context of the NIH's historic commitment to basic research.

Indirect Costs

The NIH and the academic and scientific communities are faced also with determining appropriate policies for reimbursement of indirect research costs, incurred for maintenance of facilities and equipment, administration, and other institutional overhead. These costs grew rapidly in the 1970s, a function of the increasing complexity of research and its demands on institutional resources. They have risen only modestly in the 1980s and now constitute a stable percentage of research grant costs (**Figure 15**). Yet, the disparity among institutions in indirect cost rates has contributed to confusion and mistrust among faculty and research sponsors about the legitimacy of these costs. Recently, media reports about possible abuses of indirect cost reimbursement by high-profile research institutions have produced public and congressional scrutiny and have resulted in an arbitrary cap on the administrative component of the indirect cost rate.

The AAMC has maintained that the full true costs of research, including indirect costs, should legitimately be borne by the research sponsor. Despite the impressions of many, institutions share significantly in the support of federally funded research, a fact recently confirmed by a 1992 study of 21 research-intensive institutions by the Association of American Universities (AAU) and Council on Government Relations (COGR). Medical schools have been appropriately concerned that arbitrary reductions in indirect cost reimbursement, without the benefit of data and analysis, may be forthcoming, resulting in a disruption for many medical school programs. Indirect cost policies that have the full confidence and trust of the research community, government sponsors, and the public and their representatives need to be developed without delay.

Training of New Investigators

One consequence of the effort to maintain levels of funded research grants is the constraint it imposes on funds to train new investigators. NIH funding for National Research Service Awards (NRSA) training positions, in real terms, has been fairly constant since 1985 but remains below the level of support achieved in 1980 (**Figure 16**). NRSA training support in behavioral research funded by ADAMHA shows a similar pattern. Part of the decline in support in the 1980s has been offset by the increasing support of trainees as research assistants on research project grants. The amount of this training support is not precisely determinable but is believed to be significant.

The optimal level of research training support is a matter of some debate. Observers who believe that current levels are inadequate have argued that, over

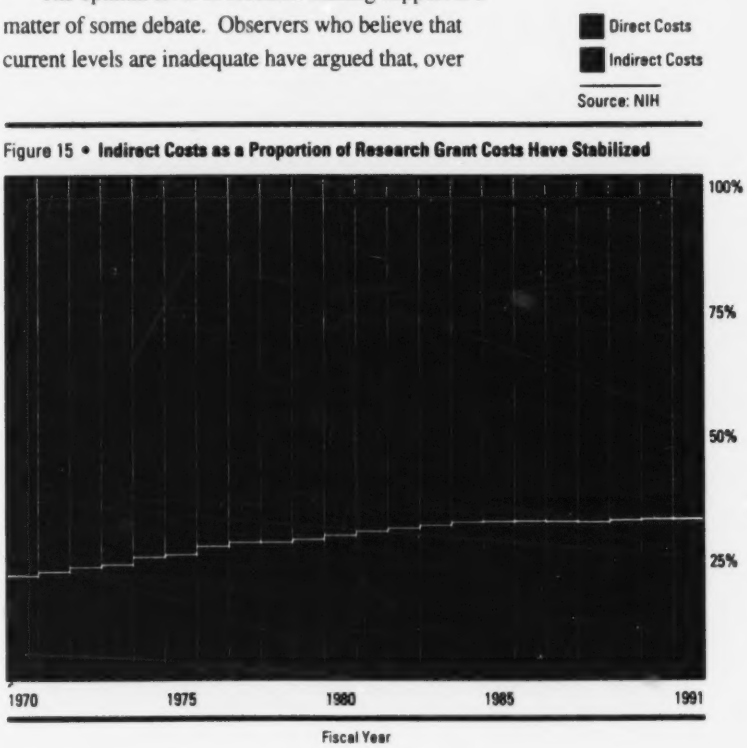
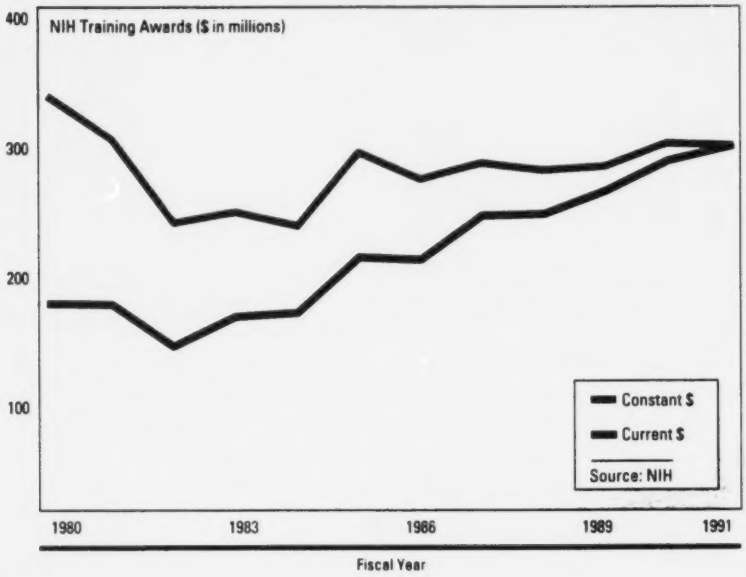


Figure 15 • **Indirect Costs as a Proportion of Research Grant Costs Have Stabilized**

Figure 16 • **NIH Support of Research Traineeships Remains below the Level in 1980**



the next 15 years, a sizable segment of the current faculty and senior biomedical research workforce will be retiring. In addition, the growth of industrial research has created a projected demand for biomedical and behavioral scientists. Competition between academia and industry for scientific talent is likely to increase. The National Academy of Sciences Institute of Medicine (IOM) has been conducting periodic estimates of training needs. The availability of predoctoral and postdoctoral NRSA training positions, funded by NIH, ADAMHA, and the Agency for Health Care Policy and Research (AHCPR), has consistently fallen short of IOM targets.

The Association has been particularly concerned about the training of qualified physician-investigators. Its interest goes back to the 1970s, when the number of M.D. and M.D/Ph.D. trainees supported by NIH began to decline. Physician-investigators serve a vital role as bridges in translating basic science discoveries into clinical applications, yet their numbers are limited. The long period of training — medical school, residency, and postdoctoral research — and the attractiveness of clinical practice may discourage young people from pursuing this career. Two NIH training programs, the Medical Scientist Training Program and the Physician Scientist Award Program, have been particularly valuable in providing research training to physicians, and their continuation and expansion have been supported by the Association. In the 1980s the proportion of postdoctoral training opportunities awarded to physicians grew. Postdoctoral awards are now almost evenly split between M.D.'s and Ph.D.'s. Nonetheless, further progress and perhaps newer avenues are required to correct the persistent shortage of competent physician-investigators.

The Department of Veterans Affairs (VA) has emerged as a major federal source of funds for the training of young physicians, as both clinicians and investigators. It is estimated that some 400 young physicians are supported yearly through the VA advanced residency training and career development programs. Private-sector funds for research training have increased appreciably over the last decade, although the sources and amounts of this support are difficult to assess and collate nationally. These are substantial additions to the resources for support of research training. Still, NIH and ADAMHA will likely continue to bear the primary responsibility for ensuring that the overall supply of properly trained investigators, both Ph.D. and M.D., is adequate to the need.

The underrepresentation of racial-ethnic minorities among research investigators is part of the larger problem being addressed by the AAMC's *Project 3000 by 2000*. Two NIH-sponsored programs, strongly supported by the Association, deserve mention in this regard. The Minority High School Student Research Apprentice (MHSSRA) Program pairs minority high school students with mentors in biomedical research laboratories. Its aim is to spark interest in research at an early stage of career development. A newly implemented facet of the program provides in-depth laboratory experience for high school science teachers with the goal of enlivening science education in the classroom. The program involves nearly 3,000 students and 500 teachers each year. The Minority Access to Research Careers (MARC) Honors Program provides special research training opportunities for minority students at the undergraduate and graduate college levels. The bulk of funding goes to undergraduate students, with about 400 training positions supported annually.

The future availability of research personnel rests ultimately on the attractiveness that research careers hold for all young people, minorities and nonminorities, and improved science education at the elementary and secondary level. The performance of

grade school and high school students in mathematics and science has become a *cause celebre* of those concerned with future American competitiveness in a global economy. This increased scrutiny is a salutary development and can only aid in developing an enhanced future generation of biomedical and behavioral scientists.

Resources and Facilities

A well-funded, systematic program for addressing a broad range of resource and infrastructure requirements is necessary to complement investments in project funding and training of research personnel. The NIH's National Center for Research Resources (NCRR) addresses these needs through a variety of programs. These include, for example, the Shared Instrumentation Grants program, which provides support for investigators willing to share the use of high-cost equipment, in the $100 to $400 thousand range. Other programs support general clinical research centers, advanced technologies, animal and where appropriate alternative models, and flexible resources to provide start-up funds or to continue research when funding interruptions occur. NCRR also supports the Research Centers in Minority Institutions (RCMI) program, aimed at strengthening the human resources and physical facilities that are necessary for high-quality research at these institutions. NCRR's continued ability to support its mission has been hampered by limited appropriations. For the last three years, NCRR funding has significantly declined **(Figure 17).**

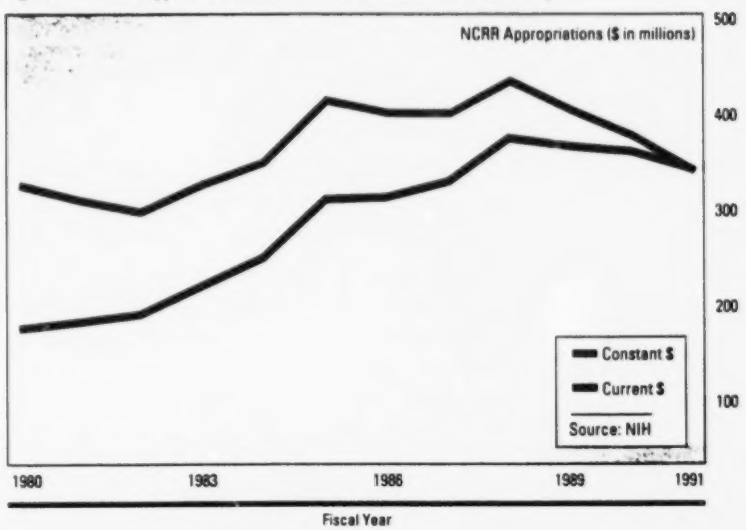
The major problem of infrastructure needed to sustain the nation's biomedical and behavioral research efforts is the aging and deterioration of research facilities. In a 1990 study sponsored by NIH, 57 percent of medical schools and 36 percent of hospitals surveyed described their facilities as inadequate to support their medical research missions. For every dollar budgeted by medical schools in 1990 for planned new research construction, they deferred another $2.10 in needed construction. For every dollar budgeted for repair and renovation, medical schools deferred another $2.30 in needed renovations.

Direct federal support of biomedical and behavioral research facilities has been virtually nonexistent since 1968, when the last dollars from the Health Research Facilities Act of 1956 were appropriated. An important exception to this trend is the growth, particularly in the 1980s, of "pork barreling," directed appropriations by influential legislators to colleges and universities in their districts. These specially earmarked funds, which bypass traditional scientific merit review, have tripled in recent years, to nearly $700 million in 1990. A significant amount of the funding has been directed to facilities construction. Earmarked funds have benefitted a few medical schools but a broad array of critics now seriously question this approach as a long-term strategy to rebuild the nation's research infrastructure.

Despite the dearth of federal facilities construction grants, medical schools have been active in expanding and replacing existing research facilities. In 1990-91 alone, 42 percent of the medical schools broke ground on new construction projects; 32 percent of schools had started projects in the previous two years. Medical schools have traditionally relied on private donations along with state and local government assistance to finance new construction projects. These sources of funding have changed dramatically to a greater reliance on debt financing, which accounted for only 15 percent of new construction funds in 1986-87 but 43 percent in 1990-91.

The growth of debt financing places added pressures on the indirect costs associated with research. Under the current, federally approved reimbursement scheme, institutions can recover part of the interest and depreciation costs of new facilities through indirect cost recovery. The attraction of debt financing may rest in part on the assumption that new facilities

Figure 17 • **NIH Support for Research Infrastructure Is Now Declining**



aid in recruiting talented and successful investigators who can win grants for the institution. Indirect cost recovery associated with those grants can be directed to debt service. Such an approach to financial planning for new construction may now be fraught with risk, given the uncertain status of indirect cost reimbursement and the more certain limitations on research funding overall.

Social and Professional Issues

The use of animals in biomedical and behavioral research and concerns about the ethical conduct of researchers have become the focus of public scrutiny. Both issues remind academic medical centers of their continuing obligation to earn public trust and support as they pursue their research missions.

Use of Animals in Research

Many if not most of the recent advances in the understanding and treatment of medical disorders have been possible only through the use of animal models in the laboratory. Restrictions on the use of animals would undoubtedly hamper the further development of many human life-saving treatment methods. As a result, public support for the use of animals in research remains strong. Still, the practice continues to be attacked by small but well-organized groups whose ultimate objective is to stop all use of laboratory animals. The more extreme of these groups have resorted to dangerous tactics — vandalism, theft, bombings, and threats — in an attempt to halt research activities. Others have worked to exert influence on local, state, and federal policy makers, resulting in various statutes and proposals for regulations on institutional care and treatment of research animals, many of which are or would be cumbersome, unnecessary, and costly.

Institutions supporting research have a responsibility to ensure that allegations of fraud and misconduct are dealt with effectively and expeditiously.

The AAMC, in conjunction with the Association of American Universities, has produced *Recommendations for Governance and Management of Institutional Animal Resources* to guide its member institutions toward responsible policies and procedures in the management of animal resources. These complement guidelines on animal care and treatment issued by NIH and the Public Health Service. Most medical school animal care facilities now meet the high standards necessary for accreditation by the American Association for the Accreditation of Laboratory Animal Care (AAALAC).

Education is necessary to continue the strong public support for using animals in research. AAMC members have been active in speaking to their local communities and in countering the negative information provided by opponents. The AAMC has produced for its members, *Saving Lives: Supporting Animal Research*, a casebook designed to assist schools in designing education and information programs. It continues to promote the value of using animals in research to the public and its representatives.

Standards of Conduct

AAMC member institutions engaged in biomedical and behavioral research face another professional challenge as a result of recent widely publicized instances of scientific fraud and misconduct. Although infrequent, such cases are serious threats to the integrity of science and undermine public trust and confidence. Institutions supporting research have a responsibility to ensure that allegations of fraud and misconduct are dealt with effectively and expeditiously. In 1982 the Association published *The Maintenance of High Ethical Standards in the Conduct of Research*, which set forth guidelines and recommendations for dealing with scientific fraud. More recently, in 1989, the Association collaborated with a number of other educational associations and professional societies to produce the report *Framework for Institutional Policies and Procedures to Deal with Misconduct in Research*. The latter document builds upon the earlier one, incorporating more current regulatory developments. It provides a model policy for handling allegations or evidence of scientific misconduct, including procedures for inquiry, investigation, appeal/final review, and resolution. The Association is now working on a further report that will provide detailed guidance to institutions on ways to handle a number of procedural considerations that arise when implementing policies and procedures on scientific

misconduct. This report, *Beyond the "Framework": Institutional Considerations in Managing Allegations of Scientific Misconduct*, should be completed by the end of 1992.

A related, but potentially more difficult, set of issues for institutions is the growth of academia-industry interrelationships and the real or perceived conflicts of commitment and interest on the part of the academic researcher. The spectacular research accomplishments of the past four decades have not only expanded the frontiers of science, but also created significant opportunities for translating basic research findings into commercially viable products. With this development has come an expansion of research relationships between industry and academia, the former drawing from the collective intellectual and creative talents of medical school faculty, the latter benefiting from an additional source of funding. As such relationships expand, faculty members find themselves with obligations and responsibilities that extend beyond the institution. Time available for their institutional responsibilities may be reduced as they attempt to live up to the expectations of their industrial sponsors. Beyond this potential conflict of commitment arising from faculty involvement with industrial sponsors is the concern about conflict of interest: situations where the professional judgment of faculty conducting research has the potential to be compromised by financial or other personal considerations. In 1990, the Association published *Guidelines for Dealing with Faculty Conflicts of Commitment and Conflicts of Interest in Research*, which provides a conceptual framework for developing institutional policies in this regard. In 1992, it published a related document, *Guidelines for Faculty Involvement in Commercially-Supported Continuing Medical Education*. Policies enforcing high standards of conduct and behavior for medical school faculty are critical if medical schools are to preserve the privilege of self-regulation they have historically enjoyed.

HEALTH CARE AND HEALTH SERVICES RESEARCH

With costs continuing to escalate, major segments of the American population uninsured or underinsured, and increasing concerns about quality and efficacy of care, health care reform is rising quickly to the top of the domestic policy agenda. In effect, precursors to major reform have already appeared, in the form of incentives to curb utilization of services and changes in the payment system for hospital and physician services. As further proposals are debated, it is important that society understands, values, and supports the special missions of academic medical centers and teaching hospitals. These include VA medical centers, which provide care to a poor and primarily elderly population and contribute uniquely to medical education and research.

"[W]e have entered a season dominated by societal concerns about the overall health care system....the 'season of accountability and social responsibility.'"

William T. Butler, M.D.
AAMC Chairman's Address, 1991

The responsibility of academic medical centers and teaching hospitals to health care reform goes beyond advocacy for these special missions. Critics have now challenged them to interpret their missions more broadly: to address the pressing social and public health issues that beset the country and to conduct the patient outcome studies and other health services research that must guide medical practice and health care interventions in the future. Academic medical institutions have historically enjoyed a special role in society. Continuation of this privileged status may depend upon how successfully these institutions meet these new challenges and contribute to solving the problems of cost, access, and quality of care that are driving health care reform efforts.

Teaching Hospitals and Health Care Delivery

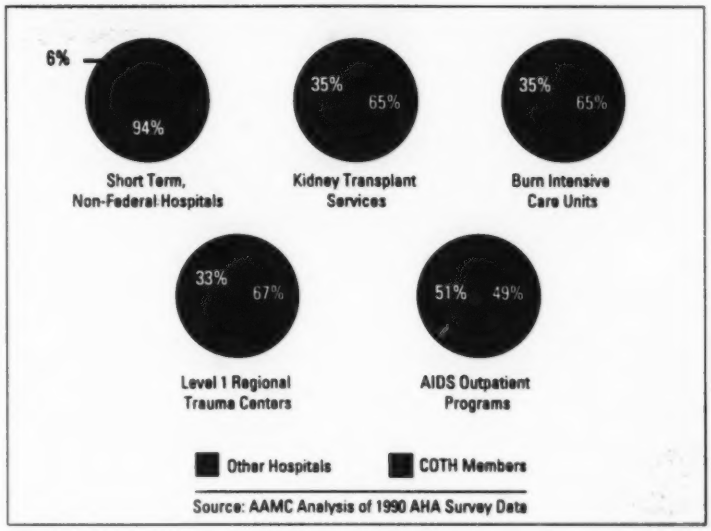
Teaching hospitals contribute uniquely to the nation's health care delivery system by the magnitude and types of services they offer and the patient populations they serve. The 287 short-term, nonfederal hospitals that are members of the AAMC's Council of Teaching Hospitals (COTH) constitute only 6 percent of all short-term, nonfederal hospitals in the United States. Yet, these hospitals account for 18 percent of the beds, 20 percent of the admissions, 23 percent of the outpatient visits, 17 percent of the emergency room visits, and 23 percent of the births at all short-term, nonfederal hospitals.

COTH members are distinguished by their provision of intensive and specialized hospital services (**Figure 18**). For example, most of the surgical transplant services in the United States, kidney (65 percent), tissue (42 percent), and bone marrow (58 percent) transplants, are located in COTH hospitals. COTH members constitute a large share of the hospitals with specialized intensive care units, neonatal (45 percent), pediatric (54 percent), and burn (65 percent). They are also leaders among hospitals in cardiac services, open-heart surgery (28 percent), angioplasty (23 percent), and cardiac catheterization labs (19 percent), and have been in the forefront in developing specialized services to the aged, including geriatric clinic services (34 percent) and Alzheimer's diagnostic services (32 percent).

More than 60 percent of COTH members are located in urban areas with populations greater than one million; a third are in major metropolitan centers with populations of 2.5 million or greater. Many of these are located in inner-city areas with high poverty rates, adding a further distinguishing feature to the profile

of the major teaching hospital. By default, urban teaching hospitals, through their emergency rooms and outpatient clinics, have become the primary care provider for the poor and medically indigent and a safety net for their health care needs. Of the $6 billion in charity care absorbed by all short-term, nonfederal hospitals in 1990, the 287 COTH short-term, nonfederal members accounted for 50 percent (**Figure 19**). They also care for a disproportionately high share of Medicaid patients. The patient populations of urban teaching hospitals present health problems embedded in the social ills that plague large cities, including drug abuse, homelessness, and violence. COTH members constitute more than one-fourth of all certified trauma centers and two-thirds of all Level 1 regional trauma centers, those equipped to handle the most severely injured patients. The urban locations of many major teaching hospitals have pushed them to the forefront in addressing the AIDS epidemic. Nearly half of all hospitals with dedicated outpatient programs for AIDS care are COTH members.

Figure 18 • **COTH Members Provide Specialized Services**

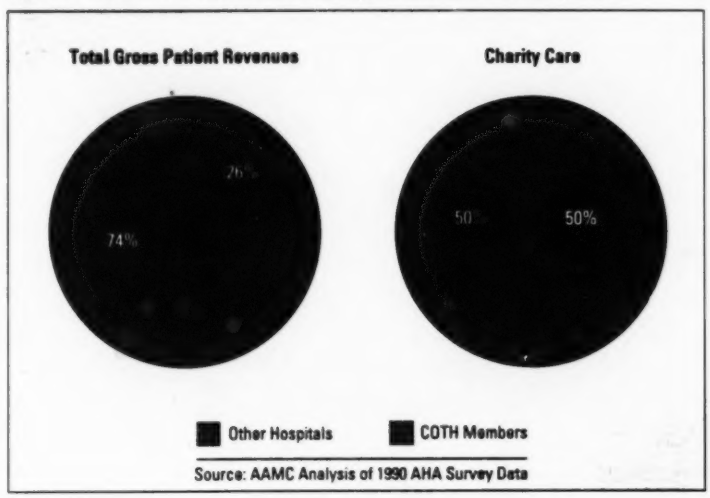


Payment for Hospital Services

Because of their unique patient profile — the wide scope of services, severity and complexity of illnesses, and care of special populations — teaching hospitals incur higher operating costs than other hospitals. Activities associated with teaching, clinical research, and the development of new technologies add further to these costs. Historically, teaching hospitals, like other hospitals, were simply reimbursed for their costs by insurers and government agencies. Cost reimbursement failed to provide incentives to hospitals to control costs, and in the 1980s, both private payers and government payers introduced new payment methods aimed at curbing the growing escalation of hospital costs.

In the private sector, the changes are seen in the growth of managed care systems, typified by health maintenance organizations (HMOs) and preferred provider organizations (PPOs). Large-scale corporate purchasers of care increasingly are using their buying power to contract directly with hospitals and other providers for health care services for their members or employees. The result for all hospitals has been a plethora of new payment arrangements — negotiated charges, fixed per diem, per case, or per capita payments, or competitively bid prices — that all have a common goal: to obtain services of adequate quality at the lowest possible price. This shift in the attitudes of private payers has put all hospitals at financial risk for atypically long lengths of stay and above average costs. Unfortunately, costs arising from the teaching and research missions of teaching hospitals and services to the uninsured are usually not recognized in payment by private payers. Teaching hospitals, however efficient, are likely to remain at a serious disadvantage when competing on the basis of price with other hospitals.

Figure 19 • **COTH Members Provide a Disproportionate Share of Charity Care**



The federal government's approach to controlling hospital costs under Medicare has been more supportive of the special contributions of teaching hospitals. With 27 percent of its discharges covered by Medicare, teaching hospitals have considered this reimbursement methodology a matter of great importance. Congress approved the new reimbursement system for inpatient services under Medicare, based on prospective pricing, in 1983. Patients were classified into one of 468 (now 487) diagnosis-related groups (DRGs), and hospitals were reimbursed a standard rate for each diagnosis adjusted for various factors that account for differences in cost.

The AAMC did not oppose the change to this prospective payment system (PPS) as a measure to control health care costs but had major concerns about the adequacy of the DRG approach to reflect the special costs of teaching hospitals. Because they offer specialized tertiary care services and serve as referral centers for other hospitals, teaching hospitals tend to attract the more severely ill patients within each DRG. These patients need to be cared for more intensely than the average patient, with a greater need for nursing and other support services, diagnostic tests, and aggressive treatment approaches. Payments based on the average DRG cost place teaching hospitals at a distinct disadvantage.

Congress recognized these concerns and attempted to deal with them through an adjustment labeled "the indirect costs of medical education." The Senate report stated:

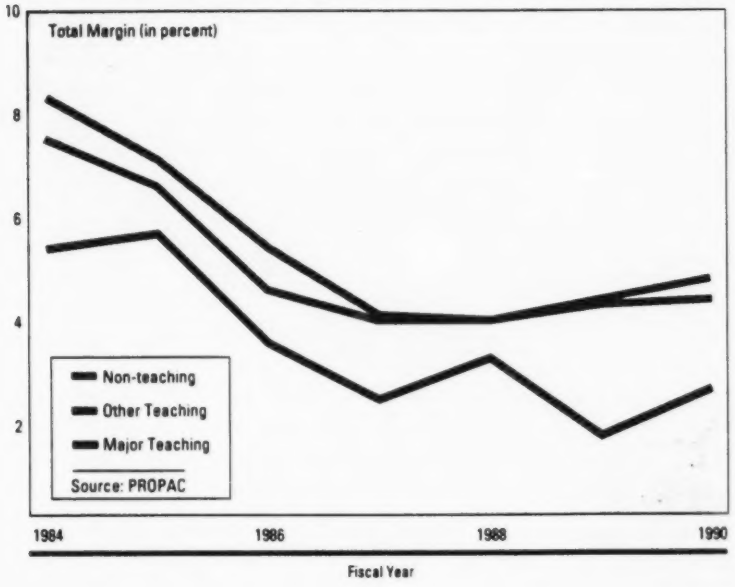
> *This adjustment is provided in the light of doubts...about the ability of the DRG case classification system to account fully for factors such as the severity of illness of patients requiring the specialized services and treatment programs provided by teaching institutions and the additional costs associated with the teaching of residents...the adjustment for indirect medical education costs is only a proxy to account for a number of factors which may legitimately increase costs in teaching hospitals.*

The label for this adjustment is misleading, because the adjustment is intended to compensate for a teaching hospital's higher patient care costs, not its educational costs. The reimbursement system also includes special payment for cases that represent statistical outliers in terms of cost and length of stay, as well as a payment adjustment for hospitals that bear a disproportionate share of care to the poor and indigent. Medicare pays separately a share of direct medical education expenses, including trainee stipends and benefits, faculty supervision and administration, support staff, space, and allocated overhead costs.

The indirect medical education adjustment represents on average 19 percent of the PPS-related Medicare payments to teaching hospitals. Without it few teaching hospitals could recover the costs associated with their care of Medicare patients. Major teaching hospitals continue to experience positive Medicare and total financial margins, revenues that exceed costs, but in the first seven years of PPS, the trend has been steadily downward (**Figure 20**). Any retreat by the federal government from this traditional recognition and support of the special costs of teaching hospitals would prove dangerous to their financial well-being.

Unlike Medicare, differential payments under Medicaid for the special costs of teaching hospitals are not required but left to the discretion of individual states. Fortunately, 6 of the 10 states with the largest concentration of COTH members do incorporate an indirect medical education adjustment into the Medicaid hospital payment rate. Nine of these 10 states specifically recognize direct medical education costs in reimbursing teaching hospitals for services to Med-

Figure 20 • **Revenues of Major Teaching Hospitals Exceed Expenses but by Smaller Margins**



icaid patients. These provisions are significant, because approximately one-fifth (19 percent) of all COTH hospital discharges involve Medicaid patients. However, reimbursements to hospitals under Medicaid tended to decline throughout the 1980s, from 92 percent to 78 percent of costs averaged across states. Presently, Medicaid reimburses the full costs of services in only three states, while in other states it pays as little as 56 percent of costs.

Teaching hospitals will also have to contend with the interest of states in enrolling Medicaid recipients in coordinated care or managed care programs, primarily HMOs and other prepaid health plans that assume responsibility for all needed care on a fixed, capitated basis. Such plans transfer the risks of treatment costs to the contracting provider. As of 1991, only 11 percent of Medicaid recipients were enrolled in managed care programs, but the number is growing.

Payment for Physician Services

Physician payment reform has followed changes in payment for hospital services. Payment for physician services has been a major component of rising health care costs, and for some time Congress has been interested in ways to control these expenditures. In 1989, it passed legislation to create a new fee schedule for the payment for physician services to Medicare beneficiaries. In January 1992, the Health Care Financing Administration (HCFA) implemented the schedule, which is derived from a resource-based relative value scale (RBRVS), covering more than 7,000 identifiable physician services. Payment is the sum of three components of cost: physician work (time and intensity), practice expense, and malpractice insurance premium expense. The relative values for each component are adjusted to reflect in part the geographic variation in these costs. A dollar conversion factor "converts" the cost components to a payment amount. Congress sets the conversion factor each year.

Through this system, the federal government hopes to slow the growth in Medicare expenditures, encourage patient evaluation and management services, reduce the payment for "overpriced" procedures, and maintain access to services by Medicare beneficiaries. In general, the new fee schedule increases payments to physicians involved in patient evaluation and management, for example, family practitioners and internists, while decreasing the amount paid for physicians performing procedures, for example, ophthalmologists and thoracic surgeons.

The new fee schedule provides a more rational basis for compensating physicians and may serve to encourage medical school graduates to pursue generalist specialties, particularly if it is adopted by other payers. As early as 1980, an AAMC Task Force on Graduate Medical Education stated that modifying physician reimbursement policies was essential to changing the specialty distribution of physicians. The AAMC's Generalist Physician Task Force in 1992 repeated this theme, arguing that the marked disparity in income between generalist physicians and those in other specialties was an obvious impediment to increasing the number of generalists. Yet, there is little doubt that payments to teaching physicians in faculty practice plans will decrease significantly, depending on service mix and geographic location. The profile of the teaching physician, one who provides specialized and highly technical services, typically in an urban setting, runs directly counter to those seen as "winners" under the plan.

In general, the new fee schedule increases payments to physicians involved in patient evaluation and management, for example, family practitioners and internists, while decreasing the amount paid for physicians performing procedures, for example, ophthalmologists and thoracic surgeons.

The Association has supported the adoption of the new resource-based fee schedule but continues to advocate refinements that would ensure equitable treatment of teaching physicians. These include providing adjustments for the intensity of physician services rendered in tertiary care, academic settings; refining the geographic adjustment factor to ensure accuracy; eliminating payment reductions for new physicians; and increasing the schedule's dollar conversion factor. The growing importance of revenues from faculty physician services to supplement funds available for teaching and research makes this an issue of intense interest. The Association has encouraged its members to conduct studies locally on the impact of the Medicare fee schedule.

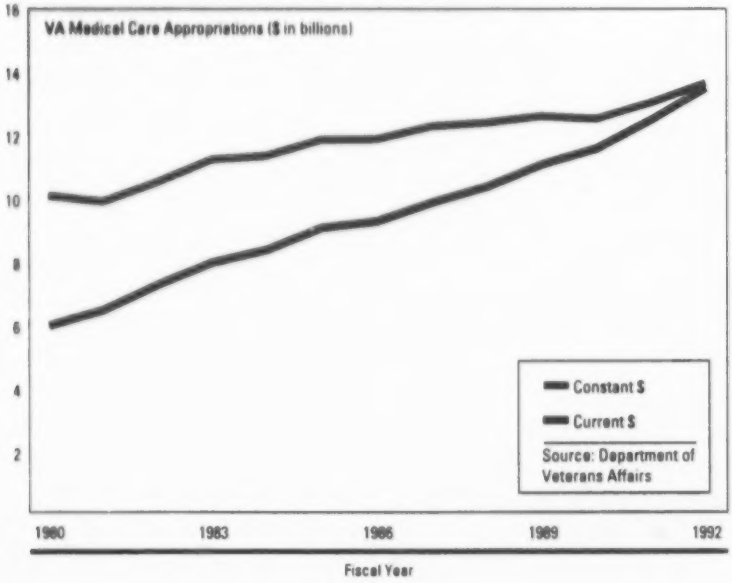
Support for VA Medical Centers

VA medical centers, many of which serve as sites for medical education and research, face serious challenges in meeting their commitment to provide quality patient care to the nation's veteran population. The scale of VA contributions to health care delivery is difficult to overstate. The VA is simply the largest organized health care system in the United States. Under current eligibility requirements, nearly half of the veterans with the highest priority for care are in a low-income category. Approximately 45 percent of those hospitalized in VA medical centers have no health insurance coverage of any kind. Thus, the VA system absorbs a large part of the burden of uncompensated care that would otherwise fall on other segments of the health care delivery system.

Over the next two decades, the current veteran population in the United States will decline slightly but age dramatically. The demographic shift began in the mid-1980s when most World War II and Korean War veterans turned 65. By the mid-1990s, those older than 65 will include a third of all veterans. These numbers portend both increases in demand for services and changes in service profiles. For example, aging veterans will have much greater need for chronic and long-term care services.

Throughout the 1980s, VA appropriations for medical care, in constant dollars, have grown only slightly (**Figure 21**). The appropriations are inadequate to recruit and retain trained staff, renovate aging facilities, replace obsolete medical equipment, and develop first-class information systems. These are the necessary ingredients for preserving VA medical centers as providers of high-quality care.

Figure 21 • **VA Medical Care Budget Has Grown Modestly**



The close partnership between the VA and academic medicine, which began in 1946 with the first formal affiliations between medical schools and VA medical centers, makes its chronic funding problems a cause for concern to the AAMC. The VA's contribution to medical education is significant: approximately one out of every two practicing physicians has received some training in a VA medical center. The VA currently provides support for 10 percent of the residents in training. The unique patient populations of VA medical centers have allowed physician investigators to advance in the treatment of diabetes, immune system disorders, infectious diseases, geriatrics, alcohol and drug abuse, and various psychiatric disorders. These same populations have allowed medical students and residents clinical experiences not available at other training sites.

The future of VA medical centers rests ultimately on new designs for a health care delivery and payment system that emerge from the health care reform movement. Their contributions to care of the poor and elderly should not be underestimated. Indeed, the picture of the older VA patient population today provides a glimpse of the national patient population two decades from now. Medical education and research have been an integral part of this health care system for nearly a half-century. Policy makers will have to decide if health care for veterans should be integrated into other existing systems of care or if VA medical centers should remain independent contributors to a national system of care.

Population Health and Health Services Research

Payment reform is but one, albeit important, component to the call for major changes in the American health care system. Payment reform springs from the need to control escalating health care costs and to finance access to care by those with inadequate or no means to pay for it. In its larger

context, however, health care reform presents academic medicine with the opportunity, some may say a demand, to reassess its role in society and to broaden its missions.

In its extreme, the call for an expanded mission is a call for change from a narrow focus on high-technology, tertiary care to one directed to the health concerns of the general population. The United States continues to trail most other developed countries on many indicators of health status, despite the extraordinary accomplishments of American medicine. Significant improvement in population health requires that medical and social institutions address the link between poverty and disease, mount more effective disease prevention programs, and promote healthy behaviors and lifestyles.

Academic medical centers and teaching hospitals do provide a comprehensive range of health care services, but they have historically directed few resources to health promotion and disease prevention in the general population or to addressing the social issues that are entwined in many modern-day health problems. Meeting these expanded objectives requires that academic medical institutions define their local populations, assess health status and health needs, and assume responsibility for maximizing the health of those populations. Such activities might include efforts to prevent teenage pregnancy, teach smoking cessation, control hypertension, improve prenatal care, counsel about dietary deficiencies, and educate in AIDS and drug abuse prevention. For academic institutions that have historically thought of themselves as major referral centers for specialized services, these changes require a major reorientation. However, they would serve to balance the current focus on high technology and tertiary care services and serve to complement changes and facilitate a better balance in the educational program.

The broadening of mission is also evidenced in the mandate for academic medical centers to conduct health services research. Health services research concerns itself with the outcomes of health care interventions. It provides information, for both physicians and patients, to make more informed choices on care. Studies are focused on both effectiveness and efficiency of treatments and provide the basis for clinical practice guidelines, which can reduce the frequency of inappropriate or marginally effective therapeutic options. Clinical practice guidelines may also be useful in limiting the current wide geographic variation in the employment of certain medical and surgical procedures, provide a rationale for insurance payment policies, and, by reducing the number of inappropriate or unnecessary services, contribute to the control of health care costs. Health services research is also critical to meeting current public demands for information on quality of care, by replacing unsophisticated methods with valid and reliable measures.

Beyond studies at the physician-patient level, health services research can be used to assess the impact of health policy decisions at a regional, state, or national level. Indeed, as researchers develop more and better indicators of health status, patient function, and quality of care, it will be possible to subject whole systems of care to scientific scrutiny. Health services research can be used to examine the cost of care not in isolation but with reference to its quality. It can help to gauge more accurately the impact of physician supply and distribution on access to care. Finally, health services research may inform national policy discussions on how best to allocate limited resources in the provision of health care services.

> "[W]e must...support in our academic medical centers health services research programs that focus on...appropriateness and quality of medical services . . . physician supply and distribution . . . outcomes of the competition model for delivering and financing medical care, and...the rapidly evolving challenges confronting traditional medical ethics."
>
> *John W. Colloton*
> *AAMC Chairman's Address, 1988*

Academic medical centers are especially well positioned to assemble the multidisciplinary team of physicians, economists, statisticians, sociologists, and other experts necessary to conduct health services research. Also, through their special responsibility to physicians in training, academic medical centers have the means to propagate sound treatment guidelines and standards of appropriate care. These institutions have already made significant contributions in health services research; expanding these efforts will serve the goals of health care reform. In 1988, the AAMC added to its mission statement the objective "to advance research in health services." It has initiated an institute aimed at

developing skills of minority medical school faculty in health services research methods and has planned a conference to discuss health services research directed at minority populations. These projects parallel and reflect the increasing attention given to health services research among AAMC members.

Both of these changes, meeting the health needs of the population and expanding health services research, parallel changes demanded in the educational mission. Academic medicine's lasting contribution to reforming health care will be in its training of future physicians for the needs of the health care delivery system. This includes reforming the curriculum to include more population-based perspectives on care, changing the sites and nature of clinical training, teaching skills in clinical decision making, and producing more generalist physicians. Changes are well under way at many academic medical centers, driven by the demand for reform and supported in part by various foundation initiatives in promoting generalist training (Robert Wood Johnson Foundation), expanding education to community-based and rural sites (Kellogg Foundation), and fostering population-based approaches to care and preventive services (Pew Charitable Trusts and Rockefeller Foundation). At other academic medical centers, changes may be less evident, but consciousness has been raised and the debate and discussion joined. If academic medical centers and major teaching hospitals are to continue to earn the trust and recognition of society, they must continue to serve societal needs. Now especially, this demands a reassessment of their missions and roles.

THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

Twenty-two medical school deans founded the American Medical College Association in 1876 to work for much-needed reform in medical education. In 1890, 66 medical college deans, again united by a common desire to elevate the standards of medical education, met to revitalize the group under its present name. The 1910 Flexner report provided the impetus for consolidating major reforms in academic medicine, including the rise of university medical education. The Association thereafter turned its attention to improving the process of medical education, still a primary focus.

In the late 1960s the Association reorganized to support better the full range of concerns — education, research and service to patients — giving teaching hospital executives, medical school faculty members, and medical students a voice in its governance. In 1991 residents were added to the governance structure to reflect the concerns of primary health care delivery and graduate medical education. Today, the Association carries out a broad range of programs and studies to represent its constituents effectively.

The Association now includes in its membership the 126 accredited U.S. medical schools and the 16 accredited Canadian medical schools; nearly 400 major teaching hospitals — including 70 VA medical centers; over 90 academic and professional societies, which represent 72,000 faculty members; and the nation's medical students and residents.

The Association is governed by an Executive Council, whose members are elected from the Council of Deans (COD), the Council of Teaching Hospitals (COTH), the Council of Academic Societies (CAS), the Organization of Student Representatives (OSR), and the Organization of Resident Representatives (ORR). The Assembly is the Association's legislative body, including all 126 members of the COD, 126 members of the COTH, 90 members of the CAS, and 12 members each from the OSR and the ORR.

Other members of the faculties and administrations of academic medical centers participate in the AAMC through six professional development groups: Business Affairs, Educational Affairs, Faculty Practice, Institutional Planning, Public Affairs, and Student Affairs. The Group on Educational Affairs includes a section devoted to resident education, while the Group on Student Affairs includes a section on minority affairs. AAMC Groups meet regularly to share information and participate in professional development activities.

The various constituencies and vast expertise contained within the Association's membership allow it to contribute greatly to policy development in medical education, biomedical and behavioral research, and health care areas. Through task forces and committees drawn from the membership, the Association has provided thoughtful commentary on major education and public policy issues — the medical school curriculum, implications of the AIDS epidemic, financing medical education, the need for generalist physicians, health care reform, scientific misconduct and conflict of interest, and future directions for biomedical research. It is uniquely positioned to speak for academic medicine on major governmental proposals and legislative initiatives. With the American Medical Association (AMA), the Association sponsors the Liaison Committee on Medical Education (LCME), an accrediting body for U.S. medical education programs leading to the M.D. degree. It also participates in the accrediting bodies for graduate and continuing medical education.

The Association is administered by a full-time appointed president, assisted by a staff of more than 200 individuals. The large complement of staff per-

mits the Association to sponsor a number of service programs for its members. Among these is the Medical College Admission Test (MCAT), a nationally standardized examination used to assess applicants' basic knowledge and problem-solving skills. The American Medical College Application Service (AMCAS) is a centralized system that enables applicants to file a single standardized form for application to participating medical schools. MEDLOANS is a comprehensive loan program developed to provide financial assistance to enrolled medical students. The National Resident Matching Program (NRMP) matches candidates to residency positions according to their preferences and those of the teaching hospitals.

The Association also conducts periodic surveys of the AAMC constituency, with the information published in regular and occasional reports. Major data and information systems on students, faculties, and institutions are maintained by the Association. The Student and Applicant Information Management System (SAIMS) includes data collected on individuals beginning with their application to medical school and continuing through residency training. The Faculty Roster System (FRS) contains information on the background, current academic appointment, employment history, education, and training of all full-time faculty members at U.S. medical schools. The Institutional Profile System (IPS) has information drawn from the annual LCME questionnaire on medical school revenues and expenditures, faculty counts, curricula, student enrollment, and student financial aid. Additional data files are maintained on the characteristics of teaching hospitals.

The Association publishes a monthly peer-reviewed journal, *Academic Medicine*, containing study reports, book reviews, editorials, and papers on national and international developments in academic medicine. Other regular publications include *Medical School Admission Requirements, United States and Canada; Minority Student Opportunities in United States Medical Schools; AAMC Curriculum Directory;* and the *AAMC Directory of Medical Education.* The Association sponsors an annual meeting each fall that attracts national leaders in academic medicine and that promotes the professional growth of individuals involved in medical education. The Association also sponsors various other symposia, meetings, and conferences of specific groups or formed around topics of interest.

For more than a century, the Association of American Medical Colleges has worked to serve its members and advance their interests: quality in medical education, achievements in biomedical, behavioral, and health services research, and excellence in patient care. Into the next century its efforts continue in pursuit of its mission — improving the nation's health through the advancement of academic medicine — and its role in providing leadership for academic medicine.